PCM
$3
April 1984
Vol. 1 No. 10
TM
THE PORTABLE COMPUTING MAGAZINE
FOR THE TRS-80 MODEL 100 . . . FROM THE PUBLISHERS OF THE RAINBOW
A Look at the TRS-80® Model 2000
The perfect mate for your M100
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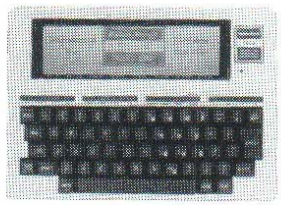

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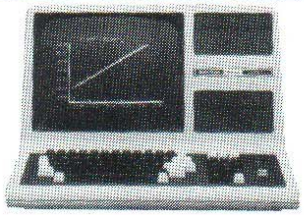

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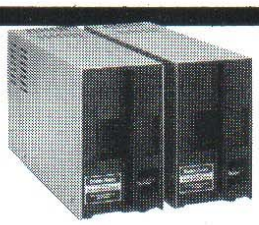

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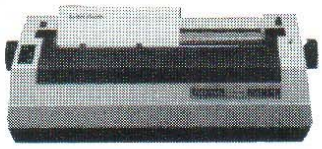

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The Portable Computing Magazine

Vol. 1, Issue 10 April 1984

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PCM is represented in the Eastern United States by Garland Associates, Inc., P.O. Box 314, S.H.S., Duxbury, MA 02331, (617) 934-6464 or 934-6546. Advertisers east of the Mississippi may contact them for further information. Advertising and Marketing Office for the Western states and provinces: Cindy Shackleford, director, 12110 Meridian South, Suite 8, P.O. Box 73-578, Puyallup, WA 98373-0578. Phone: (206) 848-7766.

PCM — The Portable Computing Magazine is published every month of the year by FALSOFT, INC., 9529 U.S. Highway 42, P.O. Box 209, Prospect, KY, 40059. Phone (502) 228-4492. **PCM — The Portable Computing Magazine** and the **PCM** logotypes are ® trademarks of FALSOFT, Inc.

Second class postage pending at Prospect, KY and additional offices. POSTMASTER: Send address changes to PCM, P.O. Box 209, Prospect, KY 40059. Forwarding Postage Guaranteed.

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Subscriptions to **PCM — The Portable Computing Magazine** are $28 per year in the United States. Canadian and Mexican rates are U.S. $35. Surface mail to other countries is U.S. $64, air mail U.S. $85. All subscriptions begin with the next available issue.

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Of Revolution And Marriage

This month's issue marks something really special for *PCM*. Pardon me if I sound excited about what's in the pages of this issue.

As you no doubt have gathered from the cover, we have some really exciting things to report in connection with bar codes. And, of no less importance, we're beginning to see a new direction for *PCM* that, I think, will greatly enhance your own portable (and personal) computing in the months and years ahead.

First things first.

We're absolutely delighted to be the first magazine in history to produce a truly workable program for reading bar codes into your computer. And, as a part of that, we are printing a short program that you can read right into your Portable Computer with nothing more than a bar code reader.

Of greater significance, however, is the fact that we plan to print several programs in bar code every month from now on. What that means is that you will — with the help of a $100 bar code reader available from Radio Shack and other sources — not have to type in programs, but simply load them in by skimming your bar code wand over the codes in *PCM*!

This, I believe, is a revolutionary concept in a computer magazine as far as we know. About five years ago, one magazine tried a bar code program employing an $800-$1,000 bar code reader. There were hardware modifications, as well. Here in *PCM*, all you need to do is type in the bar code conversion program and use it to read the codes for other programs that we will publish. And, there is one in this issue.

This means that, for the first time, neither will you have to type in the programs yourself nor buy a separate service that will give you the software on disk or tape. We know that we are the first regular magazine to make a continuing commitment to bar code-generated software. And we think that is revolutionary! In addition, we believe it will make your Portable Computer — and *PCM* — more valuable than ever before.

All this would not have been possible without the hard work of Danny Humphress, who joins our staff this month as Technical Editor. Danny has a wealth of experience as a programmer and expert in a wide variety of computer equipment — most of it from Radio Shack. This represents but the first project on which Danny will have direct responsibility, in addition to providing general technical expertise to *PCM* and you, its reader.

We feel extremely proud to have Danny join us. We believe his joining the *PCM* staff will assist us in developing truly unique concepts as well as affording us the opportunity to assist you in using your Portable Computer to its utmost.

You will no doubt notice that another contribution Danny makes to these pages this month is an in-depth review of the Tandy 2000 computer. There is more than just curiosity and inspection of a new computer from Radio Shack embodied here.

We view the Tandy 2000 as a natural partner for the Portable Computer. You may have read some of my comments in earlier issues that I believe the Portable Computer is being used by many of you as a base-away-from-home but that you, in effect, dump information from your portable into another computer when you get back to your real "home." While I think the Portable is an ideal portable and, with the addition of the Disk/Video interface (which we featured exclusively on our cover a month ago) a fine stand-alone system, too, I see the Tandy 2000 as the natural partner to the Portable.

That is the reason the review of the 2000 has more than casual interest to us here and why we feature it this month. But, more important, you will be seeing more in the nature of this "marriage" of what we consider two excellent computer systems.

Might I suggest that the Tandy 2000 is the perfect MS-DOS system to go with your Portable Computer? It has far more capabilities than does the IBM PC and the cost is significantly lower. In addition, it includes many of the features for which you have to pay extra with the IBM.

For instance: It just blows my mind that you have to fork over extra cash to get MS-DOS with the IBM. You get it for no additional cost with the 2000 — and the 2000 is still far lower in price!

No, we're not going to stint the Portable Computer. But, you will see more in the line of "marriage" of the Portable and the 2000 in the future. The reason for this is simply because we believe the two systems are excellent ones which deserve your careful consideration.

— Lonnie Falk

Letters

A VALUABLE RETURN

Editor:

I would like to thank you for the fine job you are doing with *PCM*. I use my M100 daily and want to see all the information and support I can.

The reason I am writing, however, is in reference to the letter written by A.W. Goldman of Newton, Mass., which appeared on Page 6 of the February 1984 issue. His information is fantastic and is exactly what I am looking for (or part of it anyway). However, I would like to clarify a point he made concerning the ASC(x) function. He said that it did not return values for comma, quotes, etc. If you run the following programs I think you will soon see that he was running into the error trapping inherent in the INPUT command. The second program uses INKEY$ and returns all values I have tried.

```
10 INPUTD$
20 ?ASC(D$)
30 GOTO10
```

```
10 D$=INKEY$:IFD$=""GOTO10
20 ?ASC(D$)
30 GOTO10
```

Rick McLaughlin
Battle Creek, MI

BLUEGRASS BBS

Editor:

If you know of any bulletin boards in the 606 area code, I would appreciate knowing about them. The information age seems to have started somewhat secretly here in Kentucky.

Matthew L. Mooney
Lexington, KY

Editor's Note: It did, at least where 606 area code bulletin boards are concerned. We couldn't find any. Perhaps someone else might be able to help?

THE INVISIBLE FILE

Editor:

I wish to compliment Ronald Paludan upon his excellent program, *Invisible Files*, in the February issue. I have been looking for such a utility and this one which I call *HIDFIL* works well.

It is inconvenient in one case, however. The outstanding check file, *OUTCHK.DO*, of my personal checking account program hides beautifully with *HIDFIL* but, when it is recorded back to RAM at the end of the program, it becomes visible again. This requires the loading and running of *HIDFIL* to return its status to invisible.

To correct this inconvenience I changed Mr. Paludan's program into the subroutine, *HIDSUB*, and merged it with the personal checking account program. I changed the line in this program which reads ":CLOSE:END" to ":CLOSE:Z2$="OUTCHK.DO":GOSUB7920:END".

The outstanding check file returns to its invisible status automatically now.

Note: The REM statements in the subroutine can be deleted to save memory.

```
7900 REM HID-A-FILE SUBROUTINE, HIDSUB.DO
7910 REM Z2$ MUST CONTAIN 6 CHARACTER FILESPEC (INSERT SPACES IF NECESSARY) PLUS 'DO' (NO PERIOD)
7915 REM VARIABLES USED: Z2$,Z1,Z2,Z3,Z4
7920 FORZ3=63933TO64131STEP11:Z1=1:FORZ4=1TO6
7930 IFM1D$(Z2$,Z4,1)<>CHR$(PEEK(Z3+Z4-1))THENZ1=0
7940 NEXTZ4:IFZ1=0THEN7980
7950 Z2=Z3-3
7960 POKEZ2,PEEK(Z2)XOR8
7970 RETURN
7980 NEXTZ3:RETURN
```

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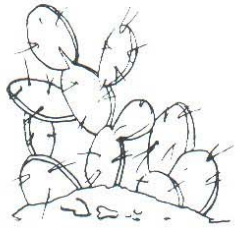

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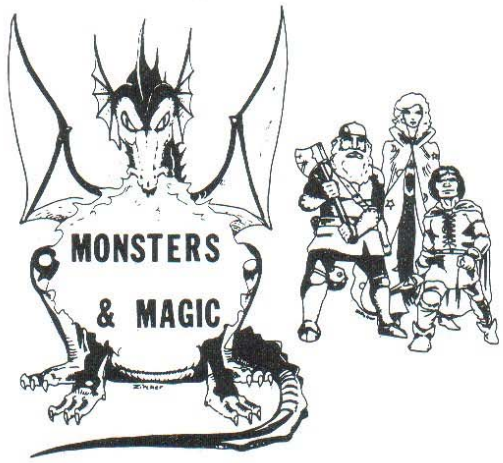

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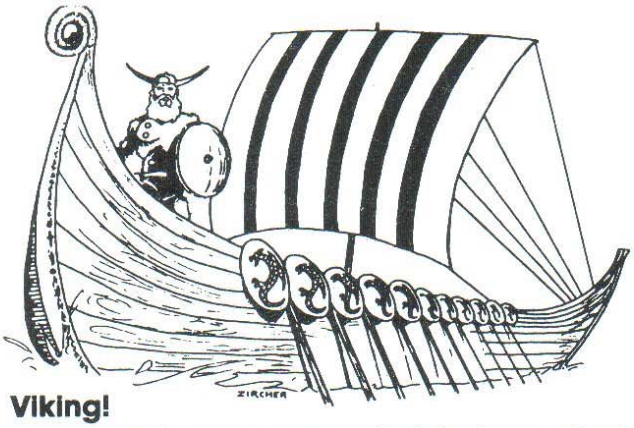

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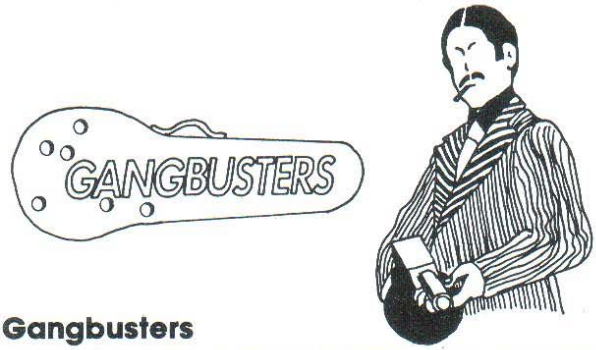

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Groundwork For Future File Handling

By Richard A. White
PCM Contributing Editor

Model 100 provides a rich, and perhaps confusing, selection of file options. Now that the disk drive has arrived, even more options will be available. It seldom hurts to get the basics down before tackling the advanced material. This month we will lay some groundwork that you can build on in the future.

A computer file is a block of computer readable data that can range in size from zero to the capacity of the storage device. A program in RAM is a file. Notes on yesterday's sales meeting are also a file. The distinction between these files is that one is executable code and the other is information that was generated by a program and can be read and used by that program. Right now I have over a dozen files stored in my M100. However, I won't want most of those files in memory in the future, though some I will want to keep somewhere.

File handling is really file transfer. Transfer may be either into or out of the computer. Transfer will be to or from some device. The computer really only cares about the input and output ports the various devices use. However, the ports are designed for specific devices. If you write code that causes data to be sent to the cassette port, BASIC figures you are smart enough to have the recorder attached and ready to run before you give the signal to go. There are six devices defined in the basic M100, the expansion interface and disk drive will add more. For now we will neglect the disk until more readers, including me, own disks.

SAVE is one of the simplest commands. It sends the program currently loaded in BASIC to a specified device. The syntax is SAVE "device:filename" or SAVE "device:configuration". The device is identified by a three-letter abbreviation that is used with SAVE and with the other file commands in the M100.

LCD defines the liquid crystal display. LPT defines the line printer. Since the file is output only to these devices and is not saved in some sort of memory, no file name is used. So, the commands are simply SAVE"LCD:", which does the same thing as LIST and SAVE "LPT:", which is the same as LLIST.

COM routes the file to the RS-232 port while MDM specifies the M100 built-in modem. Again, the file is output only and no file name is used. But, there is need to configure the ports to match the receiving computer as you do in *TELCOM*. The configuration consists of a five character string for COM or a four character string with MDM. MDM automatically sets the Baud rate to 300, which cannot be changed and is not included in the configuration string. Following are the options for each character in the order of their appearance in the configuration string.

r – Baud Rate where 1=75; 2=110; 3=300; 6=1200; 5=1200; 6=2400; 7=4800: 8=9600; 9=19200. Remember that r is specified for COM but not for MDM.

w – Word Length where 6=six bits; 7=seven bits; and 8=eight bits. Seven- or eight-bit words are most common.

p – Parity is a method of detecting transmission errors by setting one bit according to certain rules and checking that bit versus a calculation of what it should be by the receiving computer. Parity may be E (even), O (odd), I (ignored) or N (none).

b – Stop Bits serve to keep the sending and receiving computers syncronized. 1=one stop bit, 2=two stop bits with one stop bit being most common.

s – Defines XON/XOFF status. When status is E=Enable, M100 will look for characters from the receiving computer to tell it when to send and when not to send. D=Disable which turns the function off.

SAVE "MDM:7N1E" sends the current program out the modem with a seven-bit word, no parity, one stop bit and the XON/XOFF test working. SAVE "COM:58E2D" sends the current program out the RS-232 port at 1200 Baud with an eight-bit word, even parity, two stop bits and XON/XOFF

Dick White has been programming in BASIC *for over three years, and has a number of programs on the market for the Color Computer. He is also a columnist for* ***the Rainbow, PCM's*** *sister publication, and is a member of CINTUG, the Cincinnati TRS-80 Users' Group.*

disabled.

Finally, we come to the devices which BASIC expects to save the program for later recall, and therefore, requires that you provide a name under which to file the program. RAM is the memory in your M100. CAS sends the program to the cassette recorder and BASIC assumes you have the recorder setup and ready to record. The file name must start with a letter and may be up to six characters long. If you are filing to RAM, you may add a two character extension such as *.BA* or *.DO*. If no extension is specified, *.BA* is applied. Typical statements would be SAVE "CAS:MYPROG" or SAVE "RAM:MYPROG.BA". SAVE "MYPROG" sends the program to the default device, RAM, with the default extension *.BA*.

Except for LCD and LPT, SAVE as we have used it up to now, sends a byte-by-byte copy of the current program in BASIC to the specified device. The program in memory is different than you see it listed. Each keyword is replaced with a one- or two-character token. This is a shorthand that saves memory and speeds execution. Each time you enter a line of BASIC, you will notice a short delay as BASIC "tokenizes" the line. If you have a number of lines in the edit mode, tokenizing takes more time and you get the wait message so you will expect a longer delay. Though the BASIC program may be general enough to run on a number of computers with little change, it will be tokenized differently on each. A tokenized BASIC program file for one computer is worthless in another. However, an ASCII file of the program can be transported from one computer to another through the RS-232 port or through the modem and telephone. SAVE "COM:58E1E",A saves the program as ASCII characters to the RS-232, while SAVE"MDM:7N1E",A does the same using the modem. SAVE "RAM:MYPROG.DO",A saves the program to RAM in ASCII format. You then can load it into *TEXT*, send it using *TELCOM* or MERGE it into another program.

I have noticed that when I say ASCII to many users, I get a blank stare. Most of you know that a computer can only deal with numbers, and binary numbers at that. But a computer can convert binary to decimal or Hex numbers for human comsumption. Therefore, characters are represented in computer memory by specified numbers. The ASCII Character Code Table, Page 211 in your manual defines which number stands for which character. Of course, you can ask your M100 by going into BASIC and typing say ?ASC("A"). M100 will respond with 65 which is the ASCII code for a capital A. So, an ASCII SAVE of a program simply untokenizes the program and stores it like a text file using ASCII values to represent each character.

Machine language files can be saved to RAM or CAS only using SAVEM. However, you need to know the start address and end addresses in memory and the entry or execution address if it is different from the start address. Syntax is SAVEM "CAS or RAM:filename", start address, end address, entry address. You can omit the entry address and the start address will be used. Omit the device name and RAM will be used.

CSAVE and CSAVEM are shorthand commands to SAVE to the cassette. You still provide a file name and in the case of CSAVEM the addresses. Examples are CSAVE "MYPROG", CSAVE "MYPROG",A and CSAVEM "MY-

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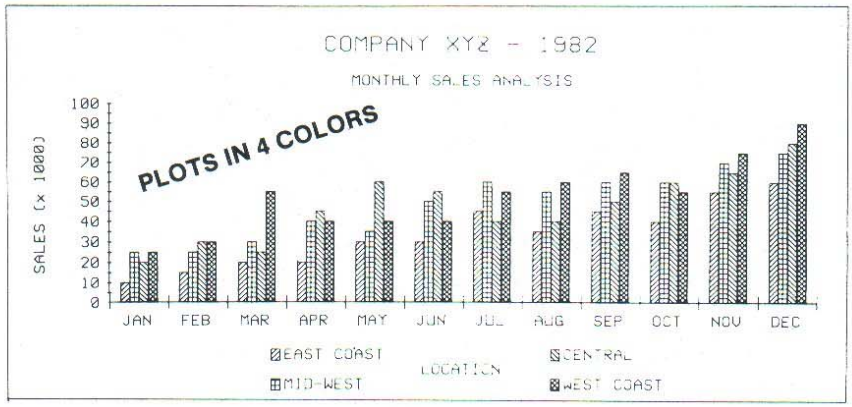

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PROG",50000,55678,50020.

LOAD brings a BASIC program from RAM, CAS, COM or MDM into BASIC, erasing any program that was there before. Its syntax and options are nearly identical with SAVE, e.g. LOAD "device:filename or configuration",R. You do not tell LOAD whether the file is ASCII and must be tokenized or if it is tokenized and can be read in directly. BASIC figures this out for you. The R suffix is optional. If R is there, BASIC will run the program as soon as it is loaded. If no device is specified, the RAM default is used.

LOADM"RAM or CAS:filename" loads a machine language program to the memory area it was saved from. This can present problems if some other file is already occupying that space. A neat feature is that BASIC prints out the start, end and entry address, and it loads the file. If device is omitted, RAM is the default. The default extension for a machine language program is *.CO*, but this is optional if the program was saved with this extension. If some other extension was used to save the program, the extension must be specified so BASIC can find the program. This same is true when you load a BASIC program.

CLOAD"MYPROG"and CLOADM "MYPROG" are shorthand versions of LOAD"CAS:MYPROG"and LOADM "CAS:MYPROG."

RUN may be substituted for LOAD saving one key stroke. It will both load and RUN the program, but this was accomplished by using the ,R suffix with the LOAD command. With RUN, the ,R has a different meaning than with LOAD. If you RUN "MYPROG", BASIC first closes all currently open files. If you RUN "MYPROG",R BASIC leaves all files open. Extension and configuration options are the same as we discussed above.

RUNM "CAS or RAM:filename" loads and executes a machine language program.

As you build an inventory of programs and program modules, you will find that it is possible to save considerable programming and debugging time by taking code from one program and using it in another. Of course, you could type the code in, but it may be easier to merge the BASIC routine into your current program. You have to do some prework. First, edit your module to get rid of unneeded code. Then check line numbers. If the same line number exists in the current program and in the one being merged in, the line in the merging program will substitute for the one in the current program. If you plan your merges before you start you can assure that line number conflicts do not exist. Then check that line numbers in GOTOs, GOSUBs and after THEN and ELSE refer to existing lines in the merged program and that these lines are where you really want the program to go. Finally, you need to save the module you are going to merge in ASCII format.

Now you are ready to make the merge. Load the base program into BASIC. Then merge using MERGE "device:filename or configuration". Device options are RAM, CAS, COM, and MDM. RAM is the default. Configuration for COM or MDM are as we discussed before. No extension is used with CAS, but one may be important coming from RAM. Suppose, you have the program "PRINTR.BA" in memory and have edited it to be merged in. Say you called the ASCII save *PRINTR.DO*, a normal default for an ASCII save. If you MERGE "PRINTR", BASIC will find *PRINTR.BA* first, try to merge it and cause an error. MERGE "PRINTR.DO" solves the problem.

Data files use a different set of commands than are used to save programs, but file name and configuration options are handled in the same way. First, it is necessary to open the file using the statement OPEN "device:filename or configuration" FOR mode AS file number. Something new is added in the form of mode and file number. Device filename and configuration are exactly the same as in program handling. OPEN allocates a buffer or section of memory for use by the specified device and file number is the number assigned to that buffer. Files may be opened and closed independently of each other and a number may be open at any time. However, BASIC expects that only one file will be open at a time unless MAXFILES is reset to the actual number of file you will have open concurrently.

There are three modes — output, input and append. In output mode, data is written sequentually to the file, starting at the beginning of the file. Append is a special output to an existing file, where data is added to the end of the file. Input reads data in from an existing file starting at its beginning. Append only works with RAM files. LCD and LPT can only be output files.

Once you open a file for output or append, you PRINT data to it. For example, PRINT #1, A$,A,B sends the string A$ and values for A and B to the file. The delimiters "," and ";" work just as they do with a PRINT or LPRINT statement. The comma tabs, or advances, the cursor to the next print zone (each print zone is 15 characters long), while the semicolon holds the cursor at the space after the last character has printed and no character separates data from two variables. This can cause a problem when inputting data back from a file. If only one variable is used in each PRINT # statement, a carriage return will separate each data item and you are assured that data will be read back in exactly as it was sent out. Best practice for the above example would be PRINT #1, A$: PRINT #1, A: PRINT #1, B.

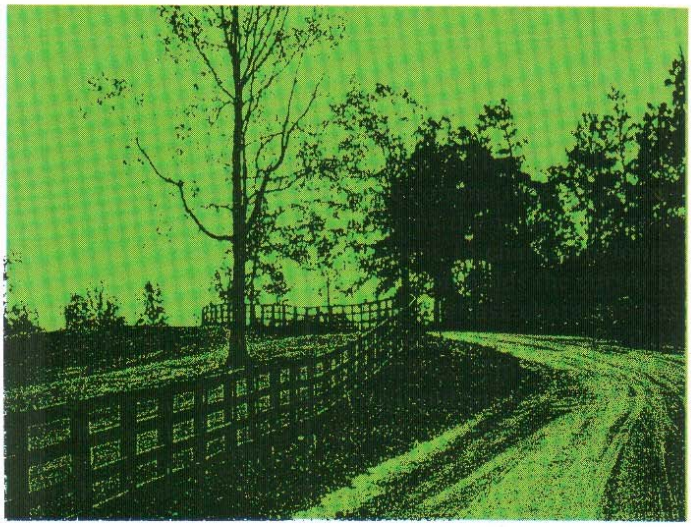
Data is recovered from a file using INPUT # file number, variable list, or INPUT$(numeric expression, file number). File number refers back to the buffer assigned in the OPEN statement. Data is pulled from the buffer into variables when INPUT # is used. The variable types must be assigned in the same order as data was saved to the file, but need not have the same names as the variables were saved from. The manual says that the data in the file must be separated by commas, which is curious since there are strong indications under the PRINT # write-up that data is best separated by spaces. The descriptions of data file format describe a file identical with a Color Computer disk file, and practices which apply there should work with M100. If data is printed in a file as single print statements, as outlined in the previous paragraph, an INPUT #1, A$, A, B will properly recover it.

INPUT$ gets a specified (numeric expression) number of characters from a particular file (file number). To use it effectively, you need to tightly control how you make the file in the first place. If you PRINT # using the comma for file formatting, then you can divide the file into data blocks that are multiples of 15. A$ = INPUT(15,1) will get 15 characters from buffer #1. If these characters are storing a number and not a character string, you recover the number using A = VAL(A$).

The foregoing discussion of files only scratches the surface. In addition to the few "watch-outs" and "how-tos," there are a few more "do's" and "don'ts" that are not covered in the manuals or which do not carry over from other machines. I will plan to deal with some of these in a future column. PCM

A New Stock Option: Monitoring Daily Fluctuations With *TRACK.BA*

By Robert Frowenfeld
PCM Contributing Editor



A few months ago I wrote a program to help *PCMers* keep track of stocks and bonds. It met with such resounding acceptance that I have decided to write a sequel. This month we're going *On The Road* with a program to help you monitor the daily fluctuations in stock prices. Using some of the graphics capabilities of your Model 100, this program will allow you to plot the daily closing price of any stock (or stocks) you choose.

I named this program *TRACK.BA* since I use it to keep track of the daily activity of my securities. The operation of the program is very simple. Option #1 from the main menu permits you to enter the date and closing price of any stock. The program asks you for the stock symbol (which can be entered in either upper- or lowercase characters) and proceeds to continually ask for a date and closing price combination until you press the F1 key when prompted for the date. The nice thing about this program is that you don't have to type in all the prices at one time since the program appends the data at the end of the data file each time it is run. When entering the date, use the format *mm/dd*; for example, April 19 would be entered as 04/19, etc.

Incidentally, the data for each stock is stored in a text file named with the stock's ticker symbol. For example, Tandy Corporation would be stored in the text file *TAN.DO*. Verbatim Corporation would be stored in *VRB.DO*, etc. That makes it handy, for in case you make a mistake, you can always go into the Model 100's trusty text editor and make any needed corrections.

Now for the fun part — plotting. When you choose option #2 from the main menu you are asked to enter the particular stock you want to plot. The program checks to see if a data file with the chosen name exists and, if it does not, lets you know with a message and the Model 100's characteristic BEEP. If the data file does exist, a neatly drawn graph will appear on your Model 100's display. One of the nice features of this program is the fact that no matter what the range of data over the course of the graph, the program will automatically scale the Y-axis accordingly. Also, the program will note the dates along the X-axis in approximately six-week intervals.

This program will work fine until you run out of room on the X-axis which will be about 220 days from now. At an average of five stock trading days per week, that's about 44 weeks. By then I'll have figured out a way to start plotting at a different point. But till then — happy trading!

(Robert Frowenfeld owns his own computer programming firm in Louisville, Ky., and has completed his graduate course work in computer science at the University of Louisville.)

The listing:

```
1 MAXFILES=2:CLEAR 1000:DEFINT I-N:DEFST
R A,R,U
2 BL$=STRING$(38," ")
5 ES$=CHR$(27):R=ES$+"p":U=ES$+"q":GOTO
35
6 LINEINPUT IN$:X=VAL(IN$):IF IN$<>"" TH
EN Y=ASC(IN$):RETURN ELSE RETURN
35 '
50 DATA "Enter Daily Prices","Graph Dail
y Prices","End Program"
52 FOR I=1 TO 3:READ M$(I):NEXT I
60 KEY 1,CHR$(1)+CHR$(13)
100 CLS:CLOSE:PRINT@51,"PCM Stock Tracke
r"
105 FOR I=1 TO 3:PRINT@(I+2)*40+11,R;I;U
" "M$(I);:NEXT I
120 PRINT@291,"Select: ";:A=INPUT$(1):X=
VAL(A):IF X<1 OR X>3 THEN 100 ELSE FX=X
130 PRINT USING"#";X;
140 ON FX GOTO 200,300,400
200 'enter
210 CLS:GOSUB 500:IF ER=1 THEN 100
220 GOSUB 700
```

```
230 PRINT@137,;STRING$(15," ");:PRINT@13
7,"";:GOSUB 6:IF Y=1 OR IN$="" THEN 100
240 GOSUB 800:IF ER=1 THEN BEEP:GOTO 230
250 PRINT@177,STRING$(15," ");:PRINT @17
7,"";:GOSUB 6
260 PR=X
270 PRINT#1,USING"##/## ###.##";MN;DY;PR
280 GOTO 220
300 'graph
305 CLS:GOSUB 500:IF ER=1 THEN 100
310 CLS:PRINT@15,"Stock: "R" "FI$" "U;
315 LINE(20,5)-(20,52):LINE(20,52)-(235,
52)
320 GOSUB 900:GOSUB 1000
330 FOR I=1 TO 6:PRINT @280-40*I,USING"#
##";LO+(I-1)*IC;:LINE(18,60-I*8)-(20,60-
I*8):NEXT I
340 CLOSE:OPEN FI$ FOR INPUT AS 1:IX=20
345 OX=0:OY=0
350 IF EOF(1) THEN 399
360 INPUT #1,A$:X=VAL(MID$(A$,6))
365 Y=52-(X-LO)/IC*8:X=IX
370 PSET(INT(X),INT(Y)):IF OX<>0 THEN LI
NE(OX,OY)-(X,Y)
380 IX=IX+1:OX=X:OY=Y:IZ=IX-21:IF INT(IZ
/36)*36=IZ THEN GOSUB 600
385 GOTO 350
399 A$=INPUT$(1):RUN
400 'end
410 CLS:MENU
500 'select stock
505 ON ERROR GOTO 580
510 CLS:PRINT @50,R" "M$(FX)" "U;:PRINT@
130,"Enter Stock ID: ";
520 GOSUB 6:IF Y=1 OR IN$="" THEN ER=1:R
ETURN
525 FOR I=1 TO LEN(IN$):J=ASC(MID$(IN$,I
,1)):IF J>97 THEN MID$(IN$,I,1)=CHR$(J-3
2)
526 NEXT I
530 FI$=IN$:ON FX GOTO 540,550
540 OPEN FI$+".do" FOR APPEND AS 1:GOTO
560
550 OPEN FI$+".do" FOR INPUT  AS 1
560 ON ERROR GOTO 0:RETURN
580 IF ERR=52 AND ERL=550 THEN GOSUB 590
:ER=1:RETURN ELSE STOP
590 BEEP:PRINT@290,"STOCK DOES NOT EXIST
";:FOR I=1 TO 1000:NEXT I:RETURN
600 'print date on graph
610 IF IX>25 THEN LINE(IX,52)-(IX,54)
620 P=IX-15:P=280+P/6
630 PRINT@P,"";:PRINT USING"##";VAL(A$);
:PRINT"/";:J=VAL(MID$(A$,3,2)):IF J<10 T
HEN PRINT USING"#";J; ELSE PRINT USING"#
#";J;
640 RETURN
700 'daily input
710 CLS:PRINT @50,R" Daily Input for: "F
I$" "U
720 PRINT@130,"Date : ";:PRINT @170,"Pri
ce:";
730 PRINT@290,"Press "R" F1 "U" to exit"
;
740 RETURN
800 'check date
805 J=INSTR(IN$,"/"):IF J<2 OR J>3 OR LE
N(IN$)<3 OR LEN(IN$)>5 THEN ER=1:RETURN
810 ER=0:IF X<1 OR X>12 THEN ER=1:RETURN
820 MN=X:DY=VAL(MID$(IN$,J+1)):IF DY<1 O
R DY>31 THEN ER=1:RETURN
830 RETURN
900 'determine y-axis hi & lo
910 CLOSE:OPEN FI$ FOR INPUT AS 1
920 LO=999:HI=0
930 IF EOF(1) THEN RETURN
940 INPUT #1,A$:X=VAL(MID$(A$,6))
950 IF X<LO THEN LO=X
960 IF X>HI THEN HI=X
970 GOTO 930
1000 IF HI-LO<=5 THEN IC=1:RETURN
1010 IF HI-LO<=10 THEN IC=2:LO=INT(LO/2)
*2:RETURN
1020 IF HI-LO<=25 THEN IC=5:LO=INT(LO/5)
*5:RETURN
1030 IF HI-LO<=50 THEN IC=10:LO=INT(LO/1
0)*10:RETURN
1040 IC=20:LO=INT(LO/20)*20:RETURN
```

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Try This Byte-Counting Utility — Just For Size

By Jim Hawk
PCM Contributing Editor

One of the first things I remember doing with my 100 when I got it home was to start typing a test file, then going to the menu to see how much the "Bytes free" number changed. And to find out how big my address file had become, I used to save it on cassette tape, then after marking down the current "bytes" number I'd "Kill" ADRS and check the number again. Crude, but effective until I found a much easier way.

I've tried several file-sizing programs for the 100 and each seemed to have its deficiencies. One would give a readout of only the first four letters of a filename, and the byte count was slightly off my "kill file then subtract" method. Another would claim bizarre sizes for machine-language files: 53610, for example (which, by the way, is the memory "address" number). But this program rectifies all those problems and adds a few embelishments. It was written by Richard Robinson and first appeared in the December 1983 issue of *TRS-80 Microcomputer News*, the Tandy publication dealing with their whole line.

(Jim Hawk has been working in radio news for the past 12 years and has a science and electronics background. He also does free-lance writing in Washington, D.C.)

> " . . . use the benchmark of dividing by 1,000 to figure [file length] out in double-spaced pages, or divide by 2,000 for single-spaced estimates."

But the first article had a bug in it, and a corrected version ran hidden in the back pages of the next issue. We thought it was so useful, *PCM* readers should have a better crack at it.

Using the program

Once you've correctly typed-in the program listing, all you need to do is save it to a filename of your choice — I use *FLSZE*. That way you only need select it on the menu and hit ENTER. Since this program takes up only 614 bytes of space, it can easily be left in memory at all times. The initial display is the first 16 filenames, their extensions and the byte-count for each. To view the rest of them, just hit any key and the second page will display. Hitting any key a second time will return you to the 100's menu. Even though there are 24 files on the main menu, five of them are taken up by the ROM programs of BASIC, *TEXT*, *TELCOM*, *ADDRSS*, and *SCHEDL*. These are not listed on the file size readout, since they reside in that ingenious 32K of Read Only Memory. But all of your RAM files will show up . . . even ones that clever programmers have hidden from view (for example, the *CORTNS.CO* machine language program that goes with the *Write+* text-formatting software). Notice that all of your own text files and programs show up capitalized, and that there are four other file names in lowercase you never

see on the 100's menu. At least two of them can take up huge amounts of RAM: "Paste.BF" refers to the *TEXT* program's Cut and Paste functions. Whenever you select text and either cut it or copy it, the memory still hangs onto a copy in the paste buffer . . . a nice touch if you change your mind about "cutting" something. So this listing of the Paste buffer's size can be important if you've forgotten about that big paragraph of text you'd cut the day before, which the 100 is still faithfully storing in that hidden "Paste.BF" (Remember that paste can be cleared by going to any text file, hit F7 and directly hit F6 — selecting nothing then cutting it) The second hidden RAM user can be "Noname.BA" which refers to the last program entered in BASIC but not saved to a specific filename. I do this a lot with games programs, CLOADing a favorite and playing it for a while, then forgetting about it till the next day when I hear a beep and see the 100 flashing "out of memory." It's easily cured by typing the NEW command, but I like this feature of the file size program. The other two non-menu files are "File" and "Reserved" — "File" referring to the number of bytes it takes to display all the filename characters on the main menu, and "Reserv.ed" standing for the amount of memory set aside by the second parameter of BASIC's CLEAR command. If your 100 has recently been cold-started, the program won't run until the operating systems are "initialized," which means you'll need to edit a BASIC program line and/or do the same with a text file. All in all, a nifty little program for a mere 614 bytes.

Now, when the boss says "how many pages is 6K?," use the benchmark of dividing by 1000 to figure it out in double-spaced pages, or divide by 2000 for single-space estimates.

To figure out the number of words in any given creation, the average length of a word is five characters, so simply divide your total by five.

The listing:

```
1 DEFINT A-Z: DEFSTR D-F: DIM F(23), A(2
3): FOR X= -1408 TO -1639 STEP -11:IF PE
EK (X) THEN FOR Z=0 TO 7: F(Y)= F(Y) +CH
R$ (PEEK (X+3+Z)): NEXT:GOSUB 8
2 NEXT: F(Y-1)="NonameBA": F(Y-2)="Paste
 BF":X= -1103: GOSUB 8:Y=Y-1: X=Y/2
3 FOR Z=0 TO Y-X: W=Z
4 IF A(W)> A(W+X) THEN B=A(W): A(W)=A(W+
X): A(W+X)=B: E=F(W): F(W)=F(W+X): F(W+X
)=E: W=W-X: IF W> -1 THEN 4
5 NEXT: X=X/2: IF X THEN 3 ELSE F(Y)="Re
served": F(Y+1)="File  BF": A(Y+1)=A(Y)
+MAXRAM-HIMEM: Y=Y+2: A(Y)=A(Y-1) +MAXFI
LES *267: Z=0
6 CLS: FOR W=Z TO 15+Z: PRINT@ (W-Z) *20
, LEFT$(F(W),6)"."RIGHT$(F(W),2);: PRINT
 USING " #####";A(W+1)-A(W);: IF W+1=Y T
HEN W=98
7 NEXT: E=INPUT$(1): Z=W: IF W=99 THEN M
ENU ELSE 6
8 A(Y)=PEEK (X+2) *256 +PEEK (X+1) -6553
6: Y=Y+1: RETURN
```

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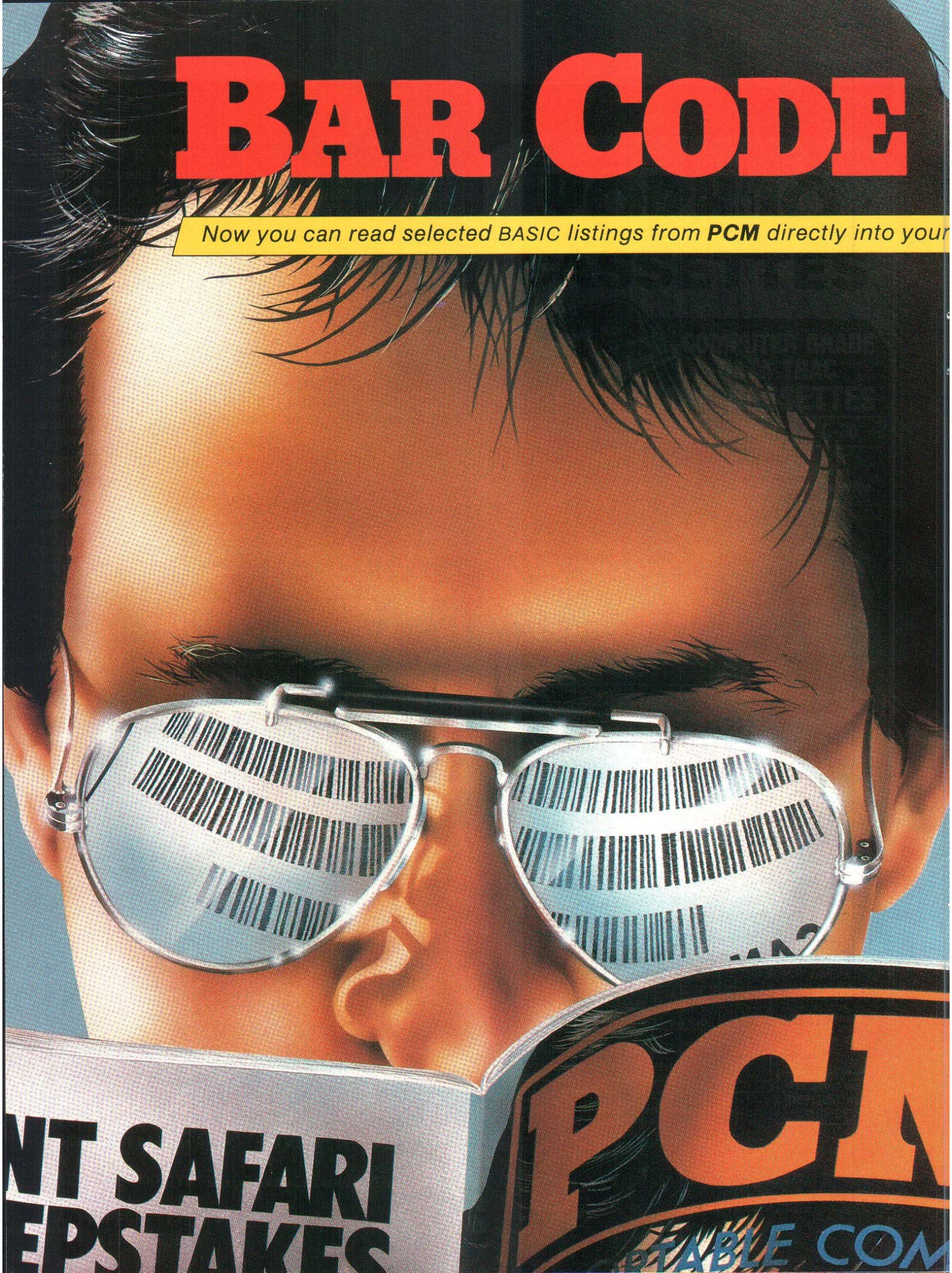
BAR CODE
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BASIC!

Model 100 with the magic of bar code technology!

By Danny Humphress
PCM Technical Editor

In these few pages, Danny Humphress gives us the conversion program to turn your bar code reader into a software generator, a tutorial to help you get the job done and a bar code listing of a BASIC program ready to scan into memory.

Bar code comes to the masses! No longer do you have to watch in awe as the checker at your neighborhood grocery store slides your purchases across a mystic window that magically "reads" those funny looking fat and skinny bars. "Personal bar code reading" has come home, and it's as close as your familiar Model 100 and your subscription to *PCM*.

With the stroke of your "magic wand," you can now rapidly enter printed programs into your computer without making a single mistake! Remember all those times you slaved over your Model 100 keyboard entering what seems like a thousand DATA statements, and then searching for hours to find those few typing mistakes that keep the program from running. Bar code puts an end to all that work.

To get started, you will of course need to pick up a bar code wand from your local Radio Shack, or one of the other companies selling BCRs, if you haven't already done so. The TRS-80 wand with which we tested our program, comes with a cassette tape with the necessary machine language bar code reader routines and a sample program. The B3OF9 program on the cassette tape will be needed to use the *PCM* Bar Code Program Decoder.

First, load the B3OF9 program into your Model 100 following the instructions in the manual that came with your wand. Now enter the accompanying program into your Model 100 and save it as *BAREAD.BA* (I'm afraid you'll have to use the keyboard here). Finally, type RUN to get everything going.

BAREAD will ask you for a filename. This is the name that will be given to the program that you read with the bar code wand. For the test bar code that follows, you may want to enter something like "BCTEST," for example. Use the same rules as you would use when naming any BASIC program. What *BAREAD* is doing here is creating a text (*.DO*) file which may be edited with *TEXT* or loaded into BASIC.

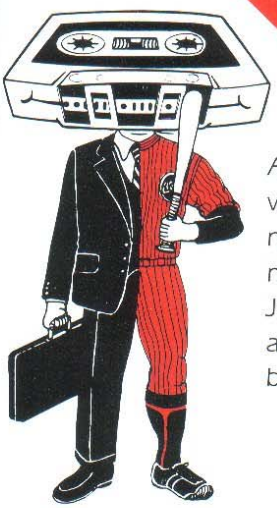
The rest of your input comes from the bar code wand. Please notice that the bar code lines are numbered. It is very important that you scan these lines in order. If you get out of order or you skip a line or two, just scan the last line (line 50 in this case) and run *BAREAD* again starting with bar code line 1. It will take a little practice to master scanning bar code. You must use a swift and even stroke across the line holding the wand at a slight angle to the paper. Press the button on the wand before you begin your scan and release it after completing the scan. The Model 100 will beep if you have successfully scanned the line. If it does not beep, scan the line again until it does. You may scan from left to right or from right to left — whichever is more comfortable for you.

When you successfully scan the final line, the Model 100 will return to the menu display. Never exit this program

---

*Danny Humphress, **PCM's** Technical Editor, is the owner of a computer software and consulting firm in Louisville, Ky. Danny brings to **PCM** his extensive experience with small business computers and applications software.*

TRS-80 MODEL 100



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by pressing BREAK, but always scan the final line of code. The final line tells *BAREAD* to close files and return to the menu display. If you should accidentally press BREAK, type GOTO 2100 before you do anything else. This will close the files and reset the machine language software.

When you're finished, go to BASIC and LOAD the program you just scanned. If you used the above example name, "BCTEST," type LOAD"BC TEST .DO". You may now run your new program (error free) or save it as a "normal" BASIC program by typing SAVE"BC TEST". If you save it as a BASIC program, the original *BCTEST .DO* text file may be deleted.

I refrain from going into details of *how* this bar code reading program works, but let you see that it *does* work. We'll dive into the bar code reader program and the program that produced the bar codes in a future article. Just for your own curiosity, these bar codes were produced on an Epson RX-80 printer. To make the codes fit neatly on the page, we reduced the original codes to 53 percent.

The encoded program which follows *BAREAD* is Vincent Lord's menu generator. Before you attempt to run the program, you will need to read "Quick Menu" on Page 27.

The listing (*BAREAD*):

NOTE: If your system incorporates the Disk/Video Interface, remove Line 20 from the *BAREAD* listing to avoid a function call error in the program.

```
10 MAXFILES=2
20 CLEAR 300,61788
30 RUNM"B30F9"
100 CLS
110 PRINT STRING$(40,"-");
120 PRINT "       PCM Bar Code Program De
coder"
130 PRINT STRING$(40,"-")
140 PRINT@171,"File Name: ";
150 LINE (132,40)-(167,40),1
160 LINE INPUT FS$
170 PRINT@160,STRING$(80,32);
175 OPEN"WAND:" FOR INPUT AS 1
180 OPEN FS$ FOR OUTPUT AS 2
190 PRINT@176,"Proceed"
200 GOTO 2000
1000 ' *** DECODE STRING ***
1010 D$=""
1020 FOR I=1 TO LEN(S$)
1030     SS$=MID$(S$,I,1)
1040     IF SS$<>"$" THEN 1100
1050     SS$=MID$(S$,I+1,1)
1060     SS$=CHR$(ASC(SS$)+32)
1070     I=I+1
1080     GOTO 1200
1100     IF SS$<>"%" THEN 1200
1110     SS$=MID$(S$,I+1,2)
1120     SS$=CHR$(VAL(SS$))
1130     I=I+2
1200     D$=D$+SS$
1220 NEXT I
1230 RETURN
2000 '*** READ BAR CODE ***
2010 PL$=""
2020 INPUT#1,S$
2030 GOSUB 1000
2040 FOR I=1 TO LEN(D$)
2050 C$=MID$(D$,I,1)
2055 IF C$=CHR$(13) AND RIGHT$(PL$,5)="D
ONE" THEN 2100
2060 IF C$=CHR$(13) THEN PRINT#2,PL$:PL$
="":GOTO 2080
2070 PL$=PL$+C$
2080 NEXT I
2090 GOTO 2020
2100 CLOSE:CALL 61807:MENU
```

BCTEST (*Quick Menu* Listing 1, See Page 27):

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The Disk/Video Interface also lets you enjoy a big 40-character by 25-line screen display on any TV. The larger screen is perfect for writing notes and reports or developing your own programs in BASIC. When accessing data by phone, you can read a full 25 lines of information without scrolling. And you can utilize all of Model 100's graphics characters.

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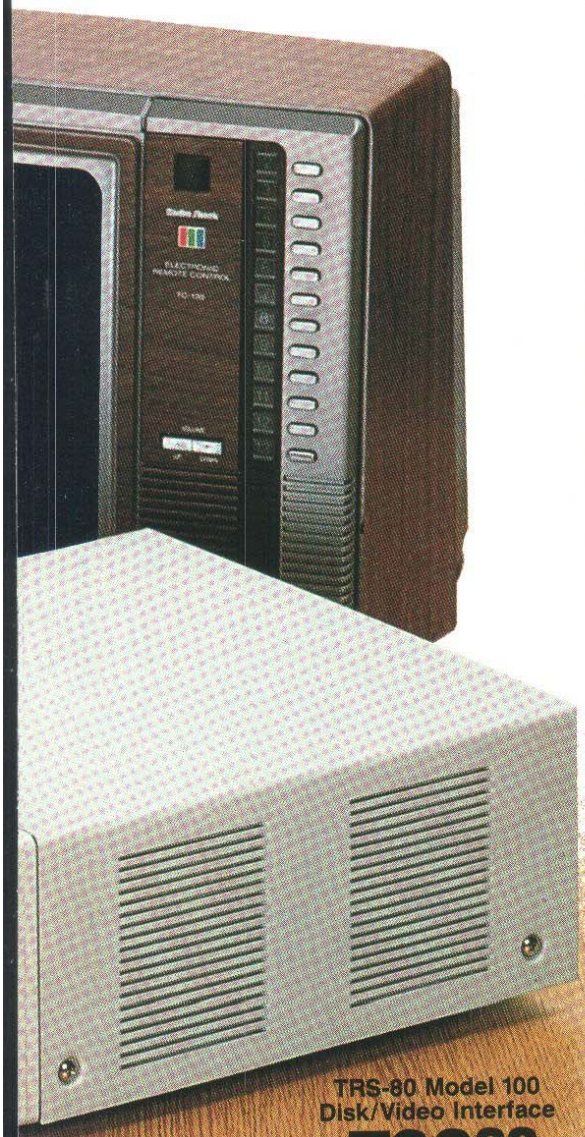
It couldn't be easier to use. Just plug the Disk/Video Interface into an AC outlet, connect your TV and a Model 100 with a minimum of 16K—all cables are included. One simple command switches all the output to the video screen. There's no new operating system to learn, either—the command structure is exactly the same.

Easily Expandable

You can add a second 184K disk drive (#26-3807, $239.95*) to the Disk/Video Interface for even more versatility. Best of all, the Disk/Video Interface doesn't use any of Model 100's standard connectors, so you can add a printer, bar code reader, RS-232C communications device or cassette recorder. You can make your Model 100 a high-performance desktop system.



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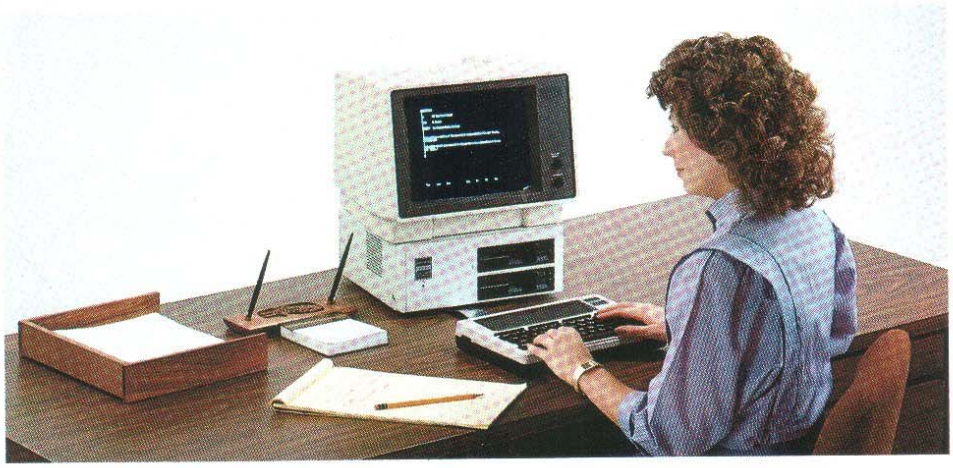

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An update of the Radio Technical Commission for Aeronautics investigation into the safety of inflight portable use

PoCo Passes Preliminary Tests With Flying Colors

By Jim Hawk
PCM Contributing Editor

Confusion still reigns in the airline industry over allowing the use of portable computers during flight [see accompanying article by Cheryl Peterson]. We've reported in two past articles about the on-going investigation of portable computers possibly creating interference in a variety of aircraft and other radios. *PCM* was the first magazine to report on the creation of a special commission by the Radio Technical Commission for Aeronautics to investigate. But there's now hope of a unified agreement — that same government/industry group has agreed on some preliminary technical standards that will allow most current portable computers to be operated onboard airliners. The Radio Technical Commission for Aeronautics agreed to the radio emissions limits at a meeting held in Washington Feb. 28 and 29.

To say that the issue of portable computers on airlines has stirred a lot of interest can be illustrated by a glance at those present at this latest meeting: Eastern, Delta, United, Air Canada, British Air and Western as well as an equal number of manufacturer reps, including Tandy. And they had plenty of ground to cover.

The major document submitted was a study just completed by the Federal Aviation Administration. Basically, it concluded that there's a major "path loss" between the passenger compartment inside and the vulnerable aircraft antennas mounted on a plane's underbelly outside. Quoting from the FAA report, "the prospect is that interference exterior to the aircraft will be a more likely source of a communication frequency signal than a high level interior signal." What that means is that operating a portable computer inside a plane generates almost negligible interference by the time it finds a path outside the metal-skinned plane . . . especially when compared to outside sources like powerful FM stations close to 108 MHz. (Frequency bands between 108 and 137 MHz support aviation communications

"All in all, the case of the flying portable computer seems to be strengthening . . ."

(Jim Hawk has been working in radio news for the past 12 years and has a science and electronics background. He also does free-lance writing in Washington, D.C.)

Whose Skies Are User Friendly?

By Cheryl Peterson

An informal survey of the airlines highlights agents' confusion.

In a reversal of a previous decision to ban their use, Eastern Airlines announced that it will allow the use of portable lap-sized computers aboard its planes. A recent press release stated that use would only be limited during takeoffs and landings, when the units would have to be stored away just like any other carry-on baggage.

Felix Forestieri, head of Corporate Communications for Latin America, said he was very glad that the airlines were able to reach the conclusion that the computers did not interfere with the navigation of their planes. As a personal computer user, he could well understand a passenger's desire to use a portable while flying.

"But we couldn't allow their use until we had assured ourselves that they would, in no way, interfere with the safe operation of the aircraft. Our tests have proven to us that they are safe," he added.

I conducted an informal survey of some of the major airlines to uncover their policies in this area. What I found was a general lack of knowledge about their policies.

Trans World, United, and American Airlines reservation clerks had an immediate answer available. American said "No." The clerk was under the impression that a study had been done and the results were unfavorable for computer users.

The other two approved. The TWA clerk referred me to my dealer, claiming that the dealer would know whether or not my particular computer would interfere with the airplanes' navigation equipment.

Ticketing agents at the other airlines I called had to get an answer from someone else. At Piedmont, Patty Wallace apologized for keeping me waiting and

(Cheryl Peterson is a free-lance writer and homemaker in Miami Beach. She started computing on an early edition Osborne 1, the first "portable." She is a regular contributor to numerous computer publications.)

and the airlines are concerned about European proposals to allow megawatt-sized FM stations.) The aircraft tested by the FAA was a Boeing 727, and some of the test equipment included a Collins signal generator, Hewlett-Packard spectrum analyzer and even an Apple computer. Results were about a 70db electromagnetic loss from the transmitter inside the 727 to the antenna outside. And any radio engineer will tell you that's a *huge* amount of signal loss. Separate testing is being done by Boeing and McDonnell Douglas, although those results aren't in yet. But even the FAA's own representative at the meeting said this one test was not enough to conclude portable computers were safe. Karl Bierach noted the initial test didn't even employ sample portables, and that there should be a "proof of the pudding test" with portable computers running a variety of software and as close to the avionics of a plane as possible before any new regulations are finalized.

Let it be noted here that airlines are unanimous about wanting to settle this matter — passengers who carry portable computers are often frequent business fliers who hold a lot of dollar sway. The airlines, anxious to attract these first-class passengers, have also been doing their own testing of portable computers for interference. United's Dennis Tangney was representative, saying there were no observable effects when a portable was operated inside the aircraft. The only detrimental effects in this hanger-based test were noticed when the portables were held in close proximity to the aircraft antenna outside (within inches) — an impossible location for passengers in-flight. Eastern Airlines also did some testing, concluding the portables should be shut off during takeoff and landing but otherwise are okay . . . curious since the couple of suspected incidents have both occurred in-flight.

Another report given to the special committee was from Hewlett-Packard tested against the Class A limits for radiation. Right now, all computers must meet the easier Class B standards.

Besides testing four of their own calculator/computer products, the HP engineers also tested the Model 100, the NEC 8201, the Epson HX-20 and the Sharp PC-5000. The results were very interesting, showing the Model 100 within the stringent Class A standard but measuring the NEC slightly over the maximum limits in the range below 2 MHz. The Epson model was well below the Class B limits, but went beyond the Class A limits just below 1 MHz and just above 100 MHz. And what one airline representative called the "dirtiest" machine by far was the Sharp PC-5000 — it was over the Class A limits in at least ten different frequencies, and even pushed slightly over the B limits in the 100 MHz range.

A second report investigating the Model 100 came from Underwriter's Laboratories, commissioned by Radio Shack. It measured the 100's performance in the ultra-low frequency range from 10 KHz to 150 KHz. And the results were just as excellent in the higher ranges, showing the 100 would fall within the government's Class A standards if they were extended downward — the current low frequency testing limit is 150 KHz. There's concern, since a plane's computerized data buses operate in the ultra-low range. Both the Underwriters and Hewlett-Packard reports tested the portable computers in a standard "looping" program, and did not seek out "worst case" software that might have produced different results. What this boiled down to in the two-day meeting was sharp disagreement over calling for a maximum level of radiated interference, and just where those technical limits should be. In the end, it was a compromise between two existing standards that Special Committee 156 favored. Specifically, the committee agreed to "use DO-160A Category A limits above 30 MHz and Category B limits from 190 KHz to 30 MHz as the baseline standards for further test." Although the committee action does not come close to the force of law, and wouldn't become official until the full RTCA gives the okay, at least manufacturers have some sort of guideline on how much shielding to use when designing new portable equipment.

The committee adjourned until the middle of June, and among the goals of that next meeting will be a special worst-case test. Technicians at Delta Airlines came up with a black box test computer that was specially designed to be a "dirty" source of radio interference. It was that black box test that convinced Eastern to lighten up on its outright ban of portables. United and Delta representatives said they also had lifted bans since the last meeting in November.

All in all, the case of the flying portable computer seems to be strengthening, and unless some convincing data comes in to the contrary, it appears that models like the 100 will soon be as common as calculators onboard U.S. airlines.

PCM

told me they needed to call the main office to find out for sure. She took my number and got back to me about 15 minutes later. For the moment, Piedmont is not allowing computer use in flight. However, a safety study is being conducted. When the results are available, she imagined that some announcement would be made.

Northwest Orient said that it would be up to the flight crew to decide. In general though, they usually allow them to be used in flight, but not during takeoffs and landings. If problems were detected, they would probably ask you to stop.

Republic had much the same response. Only if interference were detected would you be asked to put the computer away. All carry-on baggage must be stowed during takeoffs and landings.

I got two unqualified "No's" — Air Florida and Continental. Neither agent could tell me if plans had been made to investigate further.

At Pan Am, Mike Clark, the director of public relations for the southern U.S., said that computer use was permitted in-flight. "We never did ban them. We did a study early on. As soon as something like this develops, we get right on it." He also said that their independent study showed that computers were safe.

Marilyn Kucher, a spokesperson for Delta, said they were allowing them on their flights. "We have concluded that battery-powered portable computers can be used on Delta flights. We have conducted tests and our tests have not found any indication that a battery-powered portable computer would cause interference to aircraft systems, including navigation and communications."

Bob Sherman, a professional photographer from Miami, has flown several times with his Model 100. Before using his computer on board, he has always spoken with the pilot first. A recent business trip included flights on four different airlines. He was allowed to use his computer on all four. Two pilots spoke with him afterward. One said he could see no difference, the other wondered why Sherman hadn't used his computer after all. Sherman was using the computer almost the whole trip.

Until an industry-wide regulation or directive is released, though, it would be a good idea to call the airline you plan to fly before you make your reservation. If it is really important to you to use your computer while flying, reassure yourself before boarding.

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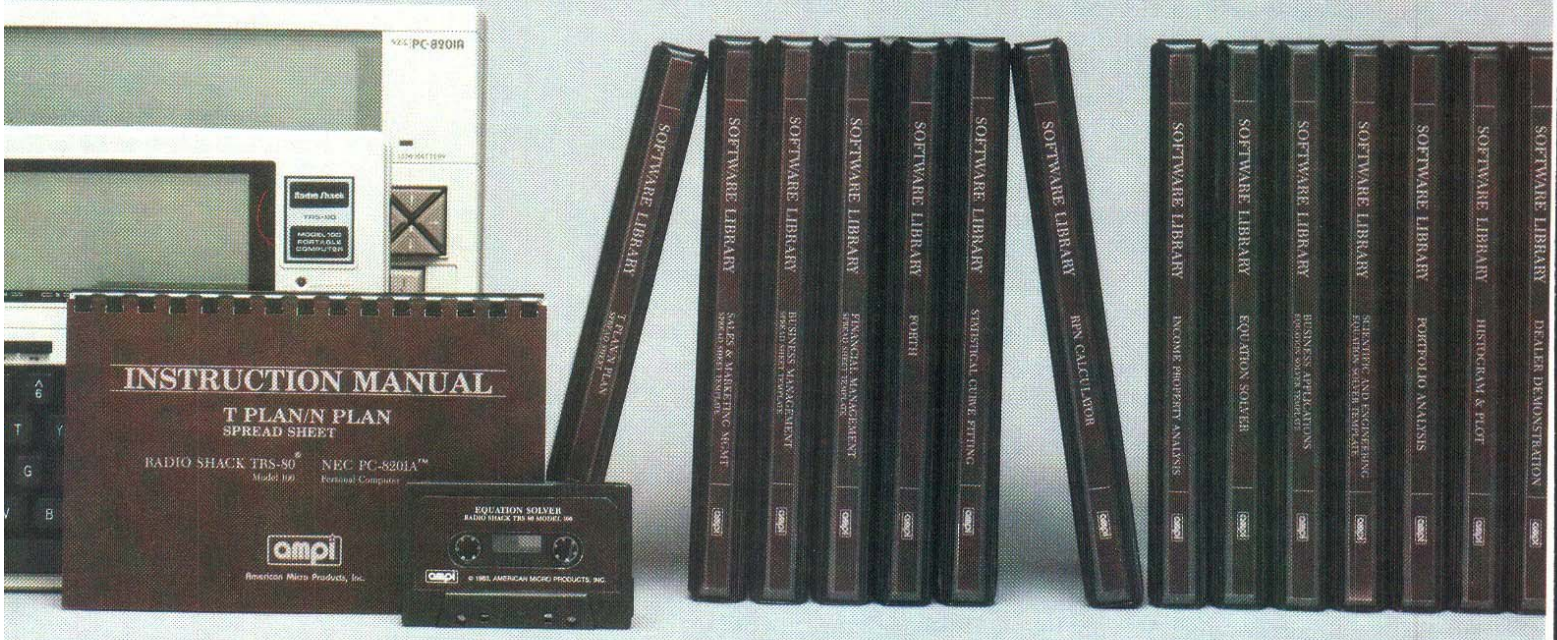

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With its built-in modem and battery-powered memory, the M100 is fast becoming known to those responsible for gathering and writing the news as . . .

THE FREEDOM MACHINE

By David W. Creed

George Rorrer Jr., sportswriter for *The Louisville Times*, writes his story about the University of Kentucky basketball game at the Vanderbilt University arena during the SEC tourney last month.

CJ&T photo by Bill Luster

ITEM: Fire hits a downtown apartment building an hour before a newspaper's last deadline. A second alarm and then a third are turned in while a reporter grabs a Model 100 and heads for the scene. She details the human drama on the scene, then borrows a restaurant's telephone to send her story to the newspaper's Atex computer system.

ITEM: A sports writer covering a state golf tournament sits in the shade of an oak tree near the 18th hole, busily pounding out his story on the Model 100 in his lap. Later, he'll stop at a phone booth and transmit his material.

ITEM: A business writer in a meeting of the state public utilities commission. A subdued clicking gives away the fact that she's taking notes on a Model 100. When the commission goes into closed session, she'll polish her notes and have a substantial amount of her story written when the public session resumes.

ITEM: A newspaper critic leaves a film premiere at a suburban theater complex and walks to a bus stop. He sits on a bench and slips his Model 100 from its case. A half-hour later, he's walking back into the office, his movie review three-quarters written.

A year ago none of that would have been possible:

The film critic would have fought theater traffic to get back to the office's computer terminals and then would have been pressed to meet his deadline. The golf writer would have depended upon the generosity of the club pro for a place to plug in his 15-pound terminal and for use of the telephone. The fire story would have been dictated to a clerk, with waste of time, spelling errors and poor flow of narrative the likely results. The business writer would have raced back from the state capital to the office or to a bureau in the capital, sorted through her notes of a complex meeting and then would have barely made her deadline. If the meeting was unusually long or dealt with unusually complicated matters, she might have missed the deadline for the first edition, causing some readers to get the news a day late.

For most daily newspapers, the introduction of computer writing and editing systems in the 1970s brought with it the need for portable dial-up terminals to use in out-of-town bureaus and to give to writers who traveled. Then, available machines were, in general, large, heavy, expensive, inflexible and less than completely reliable. It was considered a marked improvement when

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*(Dave Creed is an assistant managing editor of **The Courier-Journal**, with special computer-related responsibilities for that newspaper and **The Louisville Times**. Aside from the Model 100 he uses at work, he owns an Osborne 1 computer, which he bought in 1981 when it was 'the' portable computer.)*

the manufacturer of many of the terminals used by newspapers upgraded the amount of RAM from 2K to 8K.

Things improved in the late '70s and early '80s: The machines became more reliable, somewhat lighter and somewhat more flexible. But reporters were still shackled by the AC power cord and restricted by the size of the machines.

And the equipment was still expensive — the most useful of the models available was introduced at nearly $5,000 and still costs about $3,000 — which was a major consideration even for medium-sized newspapers like those in Louisville: We needed to equip 18 people at 12 bureaus, plus a dozen or so sports writers and other writers who traveled on occasion. Although we maintained an inventory of about 35 portable terminals for *The Courier-Journal* and its sister newspaper, *The Louisville Times*, there weren't enough terminals to meet all our needs.

Nor would the existing equipment, all of which required either AC power or a heavy battery pack, have been useful in situations such as covering a fire or a meeting.

Then came the spring of '83.

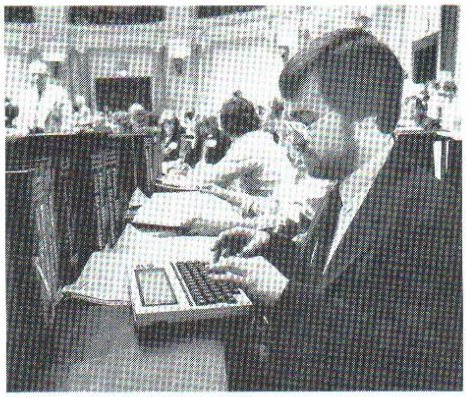
As I walked into the office one afternoon, an assistant city editor and fellow home-computer owner told me there'd been a phone call earlier: "A guy from Radio Shack says he has something he thinks you'd be interested in." His voice conveyed his amusement at the idea that Tandy would have something we'd care about — after all, didn't we both refer to Radio Shack machines as the "Trash 80"?

That was before we saw the product reviews and called the Radio Shack representative for a demonstration: We wrote stories, we edited them, we sent them to our Atex system, we got them back from Atex. Our computer technicians opened one and were impressed.

Best of all were the price and — look, Ma: No wires!

We bought two for evaluation. They passed the critical appraisal of reporters, editors and technicians alike. We rented one to help cover a visit by President Reagan. Then we ordered six more, and now have 21. Our sportswriters use eight of those machines; three more are in our bureau in Frankfort, the state capital, for use during the current session of the state legislature. The reporters plan to take them into the House and Senate chambers to write during sessions. Another is in our Washington bureau, and our correspondent there used it to write the Kentucky congressional delegation's response to President Reagan's State of the Union message. He transmitted to us from the House press gallery saving perhaps 30 minutes of time on deadline. We plan to put one in our Eastern Kentucky bureau, where the Model 100 would be ideal for covering the all-too-frequent mine accidents.

The cost has been a major factor in allowing us to do this: Even with all the accessories, we can buy four 32K machines for the price of one of the dumb terminals that had been our standard equipment a year earlier. That means



CJ&T photo by Bill Luster

Reporter Al Cross, Bardstown bureau chief for *The Courier-Journal*, writes his story from the floor of the Kentucky Legislature.

we can afford to buy machines for film critics, city reporters and business writers, that we can put computer power in the hands of people who always needed it.

Our experience isn't unique; the Model 100 has, in fact, taken the newspaper industry by storm:

Newsday, a highly regarded daily newspaper published in Long Island, covered the Winter Olympics in Sarajevo with Model 100s. *Newsday* has also equipped its bureaus in London, Mexico City and Peking with Model 100s.

The Associated Press, which has about 60 Model 100s, also used them in Sarajevo. So did the *Detroit Free Press*, which has more than 30 Model 100s.

Other major users of the machine include *The Washington Post*, which has about 60; the *Los Angeles Times*, which has 32, United Press International, the *Chicago Sun-Times* and the *Boston Globe*.

The *Minneapolis Star* and *Tribune* encourages its news employees to buy their own Model 100s and helps out by providing free RAM chips to staff members who buy the 8K version.

One major newspaper that hasn't jumped on the bandwagon is *The New York Times*, which owns just 16. Technology editor Howard Angione says the Model 100 is a godsend for reporters following the presidential candidates, but he's waiting for more memory and a display that has more than eight lines by 40 characters.

A measure of the Model 100's popularity with newspapers involves a special report on the Associated Press and United Press International wire services that goes to the 100 or so newspapers that have Atex publishing systems. Almost every week, the transmissions include BASIC programs for, or tips on, using the growing number of Model 100s — probably near 1,000 — owned by those newspapers.

In fact, programmability is one major advantage the Model 100 has over the more expensive terminals. Louisville reporters who are on the road now have tools they didn't have before: a reasonably accurate way to measure story length, a built-in calculator, and a way to make global changes in a file. That alone saves a reporter's time by allowing use of "shorthand" text entry. And we've loaded each machine with a BASIC program for file transmission that's friendlier than *TELCOM*, plus one that eases killing of *.DO* files. (Reporters tend to be "computerphobes" more often than not, so anything that eases use of the machine is welcome.)

The Model 100 isn't perfect by any means: We'd like the 64K RAM capability and the cursor key arrangement of the NEC. (In fact, we think Tandy should have made more RAM available as its latest announced enhancement, rather than the disk drive/external monitor adapter — and we're waiting for information from PG Design Electronics on its bank-switchable 32K RAM chip.) We'd like smaller characters displayed and more of them — we're waiting to see if there is truth to the rumor that there will be a Model 200 announced this summer with an 8-line-by-80-character display. We'd like it to have a built-in light so that a darkened press box wouldn't faze a sports writer. And we're glad other vendors are offering cases more useful than the soft case that comes with the machine or the plastic briefcase Tandy sells.

But with the built-in modem, the Model 100 is the best thing in its price range and, for many uses, is the best at any price. For many reporters, the Model 100 is a freedom machine. PCM

How often have you bought software and just been amazed at how quickly and nicely all the menus appear? Now you can add those same finishing touches to your own programs.

The *Quick Menu* program (Listing 1) is in bar code form on Page 19.

Quick Menu — A Programming Utility

By Vincent Lord

Want to make life a bit easier for yourself when it's time to add menus to the program you're working on? And at the same time have them appear promptly and neatly centered?

With this program used as a subroutine you can have up to five items on each menu. If you are fortunate enough to have a disk-monitor available, the selection can be expanded.

The hard part of any menu design is figuring where to locate everything on the screen, usually using the PRINT @ worksheet on Page 210 of the manual. As you are probably aware using the worksheet is very time consuming and each menu must be individualized.

To prepare a professional looking menu, add the program in Listing 1 to the end of your program as a subroutine. To prepare, for example, a main menu which would allow you to create a new file, edit file, add or delete to a file, print, or exit the menu, you would enter the necessary menu items as a string separated by a slash "/". For Example:

```
100 D$="MAIN MENU/CREATE NEW FILE/EDIT OLD FILE/ADD OR DELETE TO FILE/PRINT/END":GOSUB 30000:ON I GOTO 200,300,400,500,600
```

Then, you can enter subroutines with their respective menus and again use GOSUB 30000 to correctly print out the menu. The program will center the headings and the menu selection items. The program as listed (LISTING 1) will allow up to five selections plus the heading or title. Listing 2 can be added to Listing 1 to serve as an example of how the Quick Menu can be used in your program.

(Vincent Lord has a degree in chemistry from the University of Tennessee and has done extensive work with using computers to operate gas and liquid chromatographs.)

NOTE: Listing 1 will not run as a stand-alone. It is a subroutine which must be appended to a host program in order to run properly. The example listing below (Listing 2) will serve as such a program in order to see the *Quick Menu* program operate.

Listing 1:

```
30000 REM CREATE MENU THAT'S CENTERED
30010 J=0:K=0:L=0:N=1
30020 GOSUB 30200:CLS:P=INT((40-LEN(T$))/2)
30030 PRINT TAB(P)T$:PRINT TAB(P)STRING$(LEN(T$),CHR$(231))
30040 IF INSTR(D$,"/")=0 THEN RETURN
30050 GOSUB 30200:K=K+1
30060 IF LEN(T$)>L THEN L=LEN(T$)
30070 T$(K)=T$:IF Q<>0 THEN 30050
30080 M=INT((32-L)/2):G$=STRING$(M," ")
30085 IF K=5 THEN 30100
30090 FOR X=1 TO (6-K)/2:PRINT:NEXTX
30100 FOR X=1 TO K:PRINTG$;X"- ";T$(X):NEXT X
30110 PRINT@287,"";:INPUT"CHOOSE SELECTION NUMBER";I
30120 IF I<1 OR I>K THEN BEEP:GOTO 30110
30130 PRINT@287,STRING$(15," ");:RETURN
30200 Q=INSTR(MID$(D$,N),"/")
30210 IF Q=0 THEN T$=MID$(D$,N):GOTO 30230
30220 T$=MID$(D$,N,Q-1):N=N+Q
30230 RETURN
```

Listing 2:

```
100 D$="MAIN MENU/CREATE NEW FILE/EDIT OLD FILE/ADD OR DELETE TO FILE/PRINT/END AND RETURN TO MENU"
110 GOSUB 30000:ON I GOTO 200,300,400,500,600
200 D$="MENU/CREATE NEW MENU/EDIT OLD FILE/ADD OR DELETE TO FILE/PRINT"
210 GOSUB 30000:ON I GOTO 300,400,500,600
230 GOTO 600
300 D$="MENU/CREATE/EDIT/ADD"
310 GOSUB30000:ON I GOTO 400,500,600
400 D$="MENU/CREATE FILE/EDIT FILE"
410 GOSUB 30000:ON I GOTO 500,600
500 D$="MENU/CREATE"
510 GOSUB 30000:ON I GOTO 600
600 D$="MENU MASTER"
610 GOSUB 30000:PRINT"THIS ENDS IT":STOP
```

PCM

Greetings From A

By Randy Graham

With this article I would like to go back and pick up some loose ends from last month's "Reaching Out With *TELCOM*."

One of the applications not discussed in that article was telecommunicating with another small computer. Perhaps you and a friend want to exchange software, or you want to upload and download data to the office computer. A few special rules apply.

If you are communicating over telephone lines, you will probably use your built-in modem, which means you will be working at 300 Baud. PoCo must be in terminal mode and so must the other computer. Probably both terminal packages default to standard parameters. (Quick review for newcomers who are shy about raising their hands: "Parameters" here means the values used by the computer like Baud rate, number of bits per word, number of stop bits, and parity. "Default" means the values set by the program when you load and run it. The default parameters in *TELCOM* can be read by pressing F3 - STAT and then ENTER.) But before getting in too deep, you better check both manuals to make sure your parameters match. Otherwise, you will be sending garbage to each other.

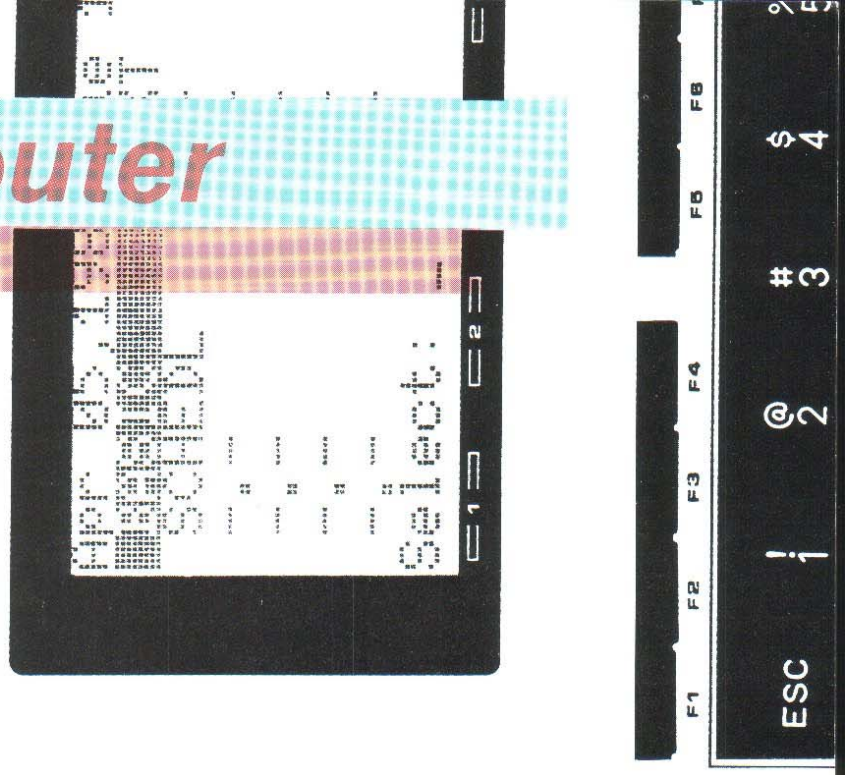
As you try out this application, I suggest that you talk to the other person by voice and have an agreement that if communication does not work in say, 10 seconds, you will turn off your modems and pick up the phones and talk.

Once you have these parameters set, you will run into a couple of new problems. Remember, we said that information service computers had a host program with "full duplex." That means that when you type a character, the host sends it back to your screen for visual verification. Well, between two small computers, this echoing of characters is missing. You will therefore have to go to *half* duplex in your TERM program. F4 toggles between full and half duplex, showing the current status on the LABEL line. (Remember, "toggle" means you push it once, it switches to HALF, push it again, it switches back to FULL.)

When in half duplex, what you type is written to the screen, just like when you are word processing. The price is that you do not know for sure what is going out over the line. Incidentally, if you forget to switch out of half duplex when working a system with full duplex, everything you type will be doubled on the screen. If you type "HELLO," your screen will show "HHEELLLLOO." This is a signal to punch F4. Only outgoing traffic is affected; incoming data will print correctly on your screen no matter which mode you have set.

There is one other adjustment you will have to make that seems peculiar to PoCo. When sending or receiving text, and the words are wrapping around, everything is fine. But at the end of the line, or to do a blank line, hitting ENTER does not do a linefeed. The cursor will go back to the beginning of the line it is on and write over it. Very frustrating. PoCo will send linefeeds, but does not recognize them for some reason. Even having the other terminal send linefeeds does not seem to work. Perhaps more expert users out there can help us out with this problem. The only solution I have found is to type CONTROL-J (i.e., hold down the control key while typing 'J'. That is the ASCII

(Randy Graham is a rehabilitation counselor working with the handicapped. Personal computing is his hobby; telecommunications one of his favorite activities. He has done freelance information retrieval and is an inveterate user of the major online systems.)



code for linefeed and will work. And if you are there reading the screen it is not too hard. Anyone know a better way?

For the second case, to communicate between computers in the same room, you need a cable. You can buy a cable and a "null modem" from Radio Shack for some money. Want to make your own? Back to school, campers! You will be working through PoCo's built-in RS-232C circuit, which means you are limited to serial input/output. Serial I/O needs only three lines: transmit, receive and signal ground. If you try to hook up two computers with a regular cable, you will have transmit going to transmit and receive to receive and nothing will happen. A "null modem" is just an inline gadget that crisscrosses these lines. If you make your own cable, you can do your own crisscrossing. It is a simple project.

All RS-232C ports seem to use the DB-25 connector. This is a two-row plug with 13 pins on the top row and 12 on the bottom so that you cannot put it in upside down. I do not know why someone selected the DB-25 plug when only three pins are needed. Whenever I ask an electronics expert, he just mumbles.

PoCo's serial port uses eight pins and you can safely ignore five of them. Get a DB-25 for your PoCo and another or whatever is needed for the other computer along with whatever length of three-conductor wire you may need.

Now, get out both manuals and identify the pins needed. A hint it took me a long time to get up nerve enough to ask about: When you look at the illustration in the manual, you are looking at the socket in the back of the computer, not the plug on the end of the wire. This means that you are also looking at the back end of the plug where you will attach the wires.

Take your plug and hold it up so you are looking at the backside with the long row on top, like in the diagram. Counting from the right, you will attach wires to pins 2, 3 and 7. Ignore the rest. Let's say you used red, blue and black wire. At the other end, attach red (transmit) to the "receive data" pin, blue (receive data) to "transmit data" and black (signal ground) to "signal ground." Solder neatly, check with an ohmmeter or other low-voltage continuity checker and you are ready to go.

Another hint. Tandy did not give us much clearance for the plug; they obviously want us to use a metal casing. But nobody makes metal casings now. Find one in a junk box if you can. I could not and so I took my penknife and very scientifically whittled down the plastic cover of the plug until it fit. You can also open up PoCo's case and file the top notch a little deeper. The bottom of the notch has plenty of room.

Okay, let's review: three wires, transmit-to-receive, receive-to-transmit and signal ground-to-signal ground. Hook them together, load your terminal program in the other computer, access *TELCOM* in PoCo and it is time to play the parameter game again.

Since you are not going to use your built-in modem, you must switch to the other port. Go to F3 - STAT and type 3711E to replace M711E. But, since you are not limited to the modem protocols, there is no reason not to use the highest possible Baud rates. Set both of them for 1200 or even 9600. Just make sure both ends are the same in all parameters. Remember to go to half duplex if you want to see what is going on and do those CONTROL-Js whenever you need a linefeed.

Now let's review this one more time. To communicate with another personal computer by phone, hook up PoCo as described in the previous article. Check to make sure the parameters are the same, go to half duplex and insert linefeeds as needed. Upload and download the same way you do when calling a

bulletin board or information service. To communicate with another computer in the same room, hook them up with an appropriate cable, switch from modem to Serial I/O port by changing the first parameter, and proceed as instructed: match parameters, use half duplex and insert linefeeds. If downloading to PoCo, make sure your F2 - DOWN feature is enabled (shows on your label line in reverse video when enabled). One more trick to learn in this lesson.

BASIC interpreters save programs in "tokenized" form which is only meaningful to themselves. The tokens are ASCII characters, but not as you and I recognize them — and not as the computer recognizes them if it thinks it is reading text instead of tokens.

Many terminal programs can transmit and receive tokenized or binary program files because a warning signal is sent along with the title. PoCo does not have this capability. It only uploads and downloads text files which are in ASCII format. What to do? Pay attention now; underline as necessary, unless you are reading this at the bookstore magazine rack.

Let's start off with your friend wanting to send you his favorite BASIC program. When all is ready, press F2 - DOWN. PoCo will ask "File to download." Name it *FREEBY* (we would call it "Freebie" if PoCo let us use seven-letter file names). When the program has been downloaded, close the file, thank your friend and get off line. Go to the menu and you will find *FREEBY.DO* waiting for you. Open this file and clean up everything that does not look like a BASIC program. Back to menu and BASIC. Go F2 - LOAD and type "FREEBY" (no extension). PoCo will flash "WAIT" and soon say OK. It has read the text file into BASIC program storage and it is ready to run. You can run it or list it. Now go to F3 - SAVE and save *FREEBY*. If you want to check, you can go to the menu and you will find both *FREEBY.DO* and *FREEBY.BA* on file. Back to BASIC to KILL *FREEBY.DO* and to dump the program from the BASIC area by typing NEW. The movement of the BASIC program from your friend's computer to yours is complete.

Now, let's go the other way. You have a program in RAM called *SUPER.BA* which you want to send to your friend. Go to BASIC. F2 - LOAD *SUPER.BA*. Okay. Now — new trick, F3 - SAVE *SUPER*,A. A pause. Okay. Type NEW to dump the program from BASIC's area. Go to menu. Lo, a file called *SUPER.DO*! Call friend. Go to *TELCOM*. Go to TERM. Toggle UP. What file? *SUPER* — and away it will go to your friend's computer. When you get off line, go to BASIC and type KILL *SUPER.DO* and everything is back to its original form. If either of these procedures for converting text to BASIC files is in the PoCo manual, I missed them.

Why go to all this trouble, you ask? Well, let's do a little arithmetic. Say, *FREEBY* and *SUPER* are 5K programs. For "5K" read "5000+ keystrokes." If you type 50 words per minute — not a bad speed for a nonprofessional touch typist — you are typing an average of 250 keystrokes per minute. It is, therefore, going to take you 20 minutes of straight typing to transmit that program from the keyboard, not counting time to correct errors and to cuss. Now, I do type at 50-60 wpm, but I am not going to do that kind of typing for my best friend — at least not very often. Let PoCo do it; that's what I hired him for!

"When you are into a high-priced database and are trying to remember your sets and search strategy, it is no time for ruminating or redisplaying . . ."

Meet "Little Sir Echo"

Time to learn another trick to improve PoCo's performance. I almost missed this one in the manual because Tandy did not surround it with flashing red lights. I have been using "echo" to name the process whereby a host computer sends a received character back for verification in the full duplex mode. Tandy is using "ECHO" to mean "turn on printer." Watch carefully, now.

Plug in your printer and turn it on. Go to *TELCOM* and to TERM. Press F5 — the word ECHO appears on your label line. Now send and receive stuff online. Lo, it is all being printed out on a piece of paper! TERM defaults to ECHO off and we never knew it was there until we enabled it. F5 toggles ECHO (print hard copy) on and off. So?

Printing online is the best improvement I have found for the limitation we noted earlier. You can only review the last eight lines received with F1 - PREV. The rest is gone . . . gone . . . gone. If you enabled DOWN, you are saving it, but to review earlier data, you will have to exit *TELCOM*, go to *TEXT* and read the file. Time wasteful.

Say, you are on a bulletin board with a lot of neat programs in the public access section and you pick out several on the list you want to download. You read one into DOWN and are ready for another. You have to ask that the list be reprinted for you, while paying long distance charges. If you are dumping to your printer, you can grab the paper that is spooling off, find the list and make your next selection. Much neater. So you waste some paper — how much does it cost to call New York from where you live?

Now, those of you who are information specialists will immediately recognize the value of this feature. When you are into a high-priced database and are trying to remember your sets and search strategy, it is no time for ruminating or redisplaying, right? Remember how many of us trained on TI printing terminals? PoCo's ECHO feature matches this capability and will make you feel right at home. The rest of you, don't worry what this paragraph means; we will get around to you in due time.

Let's play math class again about enabling your printer. If you are using your modem at 300 Baud, this means that you are sending and receiving at about 30 characters per second. Most dot matrix printers used with personal computers run at 120 cps; the cheapest I have ever used ran at 60. Daisy wheel printers usually are much slower than that, but most printers should have no trouble keeping up with your transmission. But, just in case you are curious, let's do a little more exploring and in the process meet another nice friend.

The printer is the second slowest part of any computer system. The slowest part, of course, is the dummy sitting at the keyboard, trying to find the 'X' key. Data entry is the big bottleneck of all electronic information systems and is the reason that we will do anything conceivable to transfer data electronically once we have it in memory.

Back to business. The second slowest part is the printer. The data industry is constantly working on ways to speed up printing, or to bypass the delay by using buffers and multi-tasking, et cetera. Meanwhile, all computers sit around most of the time waiting for the printer to punch its little dots on the paper. The "waiting" protocol is called XON/XOFF.

Imagine that you are dictating a note or a recipe or something to someone who is not an expert stenographer. You say a couple of words, pause, the other person says "Okay," and you say a couple of more words. Drives you crazy, what? Makes you appreciate the infinite patience of a computer. If you are reading what you are dictating, you probably put your finger on the spot where you stopped. In computers, this is called a pointer. Hah.

Now, computers are always waiting for the other person or device to get ready, to get back to work. When you are online, working at 300 Baud, the conversation between the computers sounds like this: "H"; "Wait a nanosecond"; "Did you say 'H'?"; "Wait a nanosecond"; "Yes, I said 'H' "; "E"; "Wait a nano, I have someone on the line from San Diego"; "OK, back to you; did you say 'E'?" That's XON/XOFF. If you turn it off, transmission will be much faster, but you are likely to lose data, after which it's back to the old garbage can.

Printers use this protocol all the time. Even if it has a buffer, the computer fills it instantly and then has to wait until there is more room in the buffer. Now, PoCo can cascade these protocols to insure that no data is lost.

To test this, I plugged my TRS-80 CGP-115 plotter into PoCo. This is the little fellow that draws text and graphics on narrow paper with colored ball point pens. It is a cute little gadget and a lot of fun to use with my Color Computer. Flat out, all pens flying, it prints text at 12 cps. Would I lose much text? No, not at all. I logged on to CompuServe and enabled ECHO. CGP jiggled away, writing it all down at a very slow rate. That little printer, controlling PoCo, was making CompuServe's monster mainframes *run at its speed*!

Let me put in a little plug for that plotter. It is a lightweight but versatile gadget. I can carry it around with me to list, proofread, and do memos to myself. It has to be plugged in, of course; all printers do. I guess in today's jargon, you would say that my PoCo and CGP are a "transportable" system. I think of it as an overgrown Pocket Computer. I highly recommend some such transportable printer as a friend to PoCo. I selected the CGP partly because it prints a 40-column line which makes it easy to hit the old PRINT key.

A New Day Dawning

Last month, I briefly mentioned MCI Mail as an example of what new information technology is bringing us. Let's take a closer look at a service which will undoubtedly be offered by a number of vendors. But, let me say right up front that when I mention any commercial product or service, it is just for purposes of identification: I have used it and it works as described. There may be many other similar offerings on the market which work better or cheaper or whatever.

Now, back to MCI Mail. These are the long distance people, and they have apparently teamed up with Purolator to provide the handiest service since the Western Union boy on his bicycle. As a Dow-Jones Information Service subscriber, I received an information packet describing this new offering. I have tried it out and it works for sure. It will probably be more useful to business people than to hobbyists like me, but let's give it a run-through.

You call up and logon like any other online service. Then you start writing a letter. As soon as you name the addressee, the service checks to see if that person is in its files; if so, the address is supplied. If not, you are asked to add the address to the file.

You can format your message as a letter, a memo, a report or whatever. You can choose to send copies to multiple addressees or you can choose to send it to multiple addressees as if it was an original. You can alter the contents to different addressees. Very versatile.

When it comes to composing the message, there is an online editor for your use. But, of course, you are paying connect time charges while using it. MCI invites you to compose your message offline and upload it, and with PoCo that will be a piece of cake.

It is when the time comes to specify delivery that MCI begins to shine. If the addressee is an MCI subscriber, it is forwarded electronically to his "mailbox." A copy is also filed in your electronic "in box." The basic charge for this is $1 for an "ounce." This unit is hard to define, but MCI says to estimate it at 7,500 characters.

If you want the letter printed out, you can choose regular mail. The letter will be routed to the nearest MCI facility where it will be printed out, put in an envelope and mailed. Basic cost is $2. For $6, you can choose an "overnight letter" which will be delivered by courier before noon of the next business day. And for $25, they will deliver it within four hours by courier! The last two services are only offered in selected cities. The list is sure to grow.

When you are online, working at 300 Baud, the conversation between the computers sounds like this: "H"; "Wait a nanosecond"; "Did you say 'H'?"; "Wait a nanosecond"; "Yes, I said 'H'"

But, wait — there is more, as they say in the 1-800 commercials. The letter is printed on very nice white paper and inserted in a 9 x 12 window envelope clearly identified as MCI mail. Not good enough? For a one-time charge, you can send them your letterhead and signature. When specified, your letters will be laser-printed on a facsimile letterhead and close with your facsimile signature. How about that — and in four hours to selected cities!

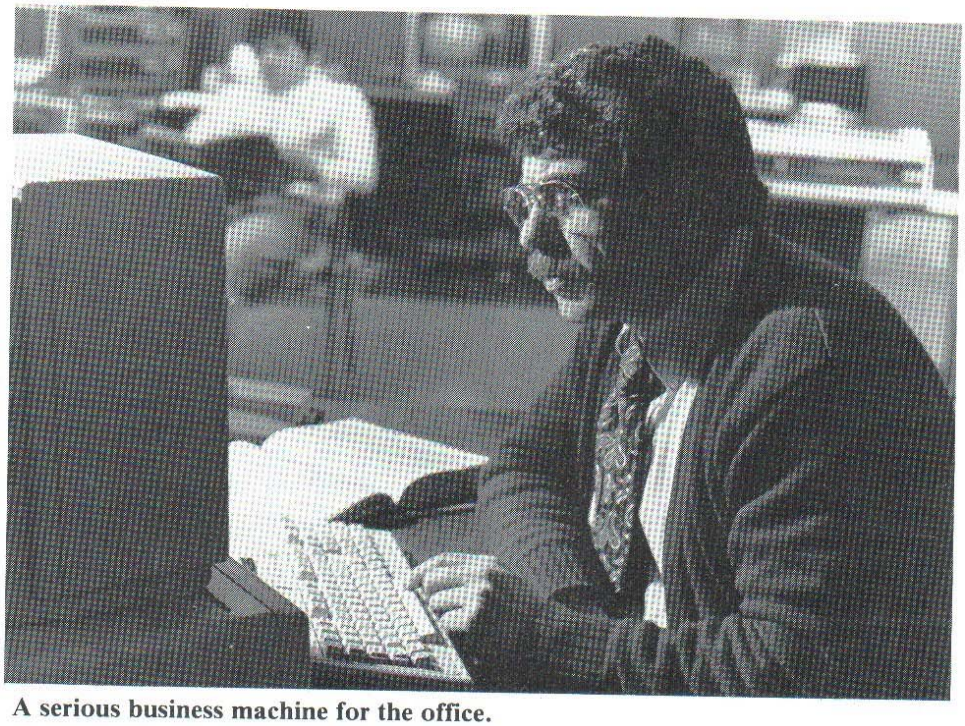
Other little goodies go on and on. As a subscriber, you receive MCI Mail. Go to your mailbox. Instruct MCI to forward it to the following addressees, with or without your appended note. For instance, the VP for marketing sends the latest hot bulletin to all regional sales managers. They, in turn, forward it with praises for the boss's great wisdom to all their field people.

If this sounds like a service you can use, I suggest you call MCI Mail at 1-800-MCI-2255 and ask for their "Welcome Kit." Say you heard about it in *PCM*. PCM

The Perfect Companion

The TRS-80 Model 2000 looms on the horizon as the most-likely home-base companion to the peregrinating PoCo.

By Danny Humphress



A serious business machine for the office.

You no doubt already know about Tandy's newest child, the TRS-80 Model 2000. With all the excitement surrounding the introduction of a new computer, it is difficult to get an understanding of just what a system will (and will not) do. Now that the dust has settled, let's take a closer look.

On November 28 Tandy officially unveiled the TRS-80 Model 2000 Personal Computer at Comdex in Las Vegas and, on December 1, in Radio Shack Computer Centers and Computer Plus Centers all around the country. I am naturally skeptical when a company uses phrases like "ultra performance," "dramatic speed," and "exciting" in its sales brochures for a new computer, but upon close examination of the slick new computer, I found that those words were not exaggerated as much as I suspected.

Raw Facts

The Tandy TRS-80 Model 2000 is a 16-bit "personal computer" that uses the popular Microsoft MS-DOS disk operating system. Although it is similar in features to the IBM Personal Computer, Tandy is quick to point out that it is not another IBM PC compatible but a much more advanced machine that just happens to run most IBM PC software.

The basic computer comes with 128K memory, two 720K disk drives, detachable keyboard, RS-232C port, Centronics parallel port, and monochrome display connector. All this for $2,750. For $4,250 you get a Model 2000HD which has the same features except with an internal 10-megabyte hard disk and a single floppy disk drive. All you need for a working system is a VM-1 monochrome monitor for an additional $249. A minimum workable Model 2000 system costs just under $3,000.

MS-DOS and Microsoft's GW BASIC are included with the Model 2000 along with a "Getting Started" book that helps you get going right away without diving into the two other hardbound BASIC and MS-DOS reference manuals. A small Reference Guide is also provided.

Because the Model 2000 uses a fast 16-bit Intel 80186 processor running at 8 MHz, its speed is noticeably better than any other TRS-80 available to date except the Model 16B. The built-in 5¼" thin-line drives sport a 720K storage capacity each for a total of almost 1.5 megabytes. The minimum memory of 128K is expandable to a 768K in 128K increments.

Expansion Options

Radio Shack has finally turned away from the "only we shall see the inside of your computer" policy. This is a very welcome change and one that should open the way for many third parties to manufacture nice user-installable options. On the back of the Model 2000 are four panels which can be removed to reveal slots for four option boards which can be easily slid in or removed. When you purchase an expansion board such as high resolution graphics, you take it home and spend 15 minutes installing it yourself (14½ minutes are spent reading the installation instructions). There will no doubt be many companies making the 2000 do some amazing things by just sliding in expansion boards. This is part of what made the Apple IIe and IBM PC so popular.

You may choose from two monitors for your Model 2000. The VM-1 Monochrome Monitor gives you a sharp 80 x 25 display with a low-glare green phosphor 12" screen. It connects directly to the computer requiring no additional boards. The CM-1 Color Monitor requires the High Resolution Monochrome Graphics board and the Color

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Graphics Chip Set to operate and offers high resolution color graphics. The screen measures 14". While the color graphics are exceptional, the image is difficult to see when the sun shines through your office window in the morning. This isn't the monitor of choice unless you plan to use graphics often. A solution is to have both monitors to the computer. Yes, it can be done — IBMers often use two monitors on their systems. The VM-1 sells for $249 and the CM-1 for $799.

A mere $449 buys you the user-installable Monochrome Graphics option. With it, you can easily access 600 x 400 one-color graphics on either the VM-1 or CM-1 monitors. If you have a CM-1 Color Monitor, you'll want to add the Color Graphics Chip Kit for an additional $199. This kit installs on the Monochrome Graphics board. Radio Shack suggests that you let them install it for you, but if you can follow the included installation instructions, there is no reason that you cannot install it yourself. The prices of these graphics options seem high, but the total system price for a comparable IBM PC configuration is still quite a bit more.

If you plan to use your Model 2000 primarily in the home, which I doubt many will, you can purchase the TV/Joystick Adapter for $249.95 and connect your Model 2000 to your home television. This adapter is, however, a low cost way to get color graphics from your 2000, sacrificing half the resolution of the more expensive Hi-Res and color board. This option was not available at the time of writing, so I have not had a chance to see it first hand.

Radio Shack has jumped on the "mouse bandwagon." For those of you who've been vacationing on Jupiter for the past two years and are not aware that computer mice are not related to Mickey and Minnie, I'll give you a short update. The mouse is a small hand-held device connected to your computer that looks very similar to nature's counterpart. As you move the mouse with your hand across your desk, a corresponding pointer lets you point to and select options on the computer screen. The mouse gives a computer user a more natural way to use computers by using the oldest form of human communication — pointing.

The Digi-Mouse and Digi-Mouse/Clock Controller Board allow you to use "mouse-driven" software such as Microsoft *Word* on your Model 2000. The new Microsoft *Windows* operating environment software is included with the controller board. *Windows* lets you view several working programs simultaneously on the computer screen by sectioning the screen into "windows." The size of the windows and functions of the *Windows* software is controlled by the mouse. This software alone is almost worth the price of the board. Totally unrelated to the mouse functions, this board also gives your computer a battery operated clock which frees you from having to enter the date and time each time you turn on the computer. The Digi-Mouse will cost you $99.95 in addition to $119.95 for the controller board. It was not available at the time of the writing of this review for evaluation.

When you upgrade your computer to 256K from 128K, you need to purchase the $299 Internal 128K Kit and have it installed by Radio Shack. It's a shame that Radio Shack does not either already include 256K, since many software packages require 256K, or at least make this a user-installable option. After you have the first 256K, you can install up to two External 256K Expansion Boards. These boards come with 128K already installed for $499 and you can install the 128K RAM upgrade chips on the board yourself for another $299 per set. To have a 512K system, you need to have Radio Shack insall the first 128K option which goes directly on the computer's main board, buy an External 256K Expansion Board and install an additional 128K RAM upgrade on the board.

One of the few expansion features that is not user installable is the internal 10-Megabyte Hard Disk. For a surprisingly low $1,699, the hard disk installs inside the computer without taking up space normally used for a floppy disk drive. The IBM-PC XT's hard disk, for example, takes the place of one of the floppy disk drives, making it necessary to add an expensive expansion box if you want two floppy disk drives in addition to the hard disk. Smart move, Radio Shack. What may not be so smart, though, is the lack of connectors on the hard disk controller board (which, by the way, uses one of the four available expansion slots) for adding external hard disks. Although the manual shows these connectors on the board, the finished product does not have them. Radio Shack says they will have another way of adding hard disks. We'll see.

One of the more nifty options available for the 2000 is the Floor Stand and matching Monitor Pedestal. The Floor Stand lets you get your 2000 off the desk and out of the way standing vertically on the floor. You can even rotate the name plate on the computer so it looks like it is meant to stand on its side. Very cute, indeed. The floor stand costs a modest $145 and includes a keyboard extension cable so you don't have to sit on the floor to use the computer. The monochrome VM-1 monitor may be placed on the Monitor Pedestal ($89.95) which allows you to adjust it for the best viewing angle. The CM-1 monitor does not work with the pedestal, though.

Software

It seems that Tandy has recently discovered that you need software to sell computers and that their in-house software production efforts are not enough to keep up with the growing demand for quality software.

Thus, they have begun an aggressive adaptation of popular software for their computers — especially the Model 2000.

Now available through Radio Shack are software packages I never thought I would hear Tandy employees openly discuss, let alone see on Radio Shack shelves. Among the popular third-party software packages for the Model 2000 now bearing a Radio Shack catalog number are *PFS:File*, *PFS:Report*, *dBASE-II*, *The Home Accountant Plus*, and *The Witness*. All have their copyright holders' trademarks. This is not a minor move for Tandy, which should mean that you'll be seeing a lot more software available for all TRS-80 computers through the Shack.

Radio Shack is also starting a program where you may order many popular private-label software packages directly through your local Computer Center for fast delivery. Radio Shack will act only as a dealer for these packages, thus you'll need to go directly to the publisher for support for the software. Initially, most of this software will be for the Model 2000, but they expect to have software available for all models through this innovative program. The future certainly looks bright for Model 2000 software.

Radio Shack has many packages already available for the 2000 and many more are listed in the RSC-11 catalog that will be available soon. Included are *MultiMate* word processing, *dBASE-II*, *MAI/BASIC Four* integrated accounting software, and Microsoft programming languages such as MS-FORTRAN,

MS-PASCAL, and MS-GW BASIC Compiler. Also available is RM-COBOL which is the same COBOL package Radio Shack sells for its other computer.

IBM Software Compatibility

Most frequently asked is the question of compatibility with IBM PC software. While the 2000 will not run all packages designed for the IBM PC, it will run a vast majority of them with little problem. You cannot just put in an IBM disk and boot up, but you can copy programs from an IBM format disk to the higher-density Model 2000 format very easily. Most programs will then run as normal.

Tandy has done a service to potential Model 2000 owners by providing a list of software packages that are known to work on the Model 2000. They've even gone one step further by publishing a list of software that will not work on the Model 2000. A note here: The current list of non-working software includes the granddaddy of word processors, *WordStar*. It has recently been discovered, though, that the version of *WordStar* for IBM PC works perfectly well on a Model 2000. Tandy has sent an update to their stores to this effect.

Problem software packages include those that use a copy protection scheme that will not allow you to copy it to a Model 2000 disk and software that directly accesses the IBM's hardware. Packages that use only standard BASIC and/or published MS-DOS system calls should work with no problems on the Model 2000. Some graphics packages will not work or will work differently because of the higher resolution and extended range of colors on the 2000.

Notable exceptions to software that will not run on the Model 2000 include *VisiCalc* and *Lotus 123*. These are two very popular IBM packages. *Lotus 123* is a spreadsheet program that offers sorting and instant graphics. A more advanced program, *Ovation*, is coming for the Model 2000 this summer and it was recently disclosed that Lotus will make *123* available for the Model 2000 shortly thereafter. For now, though, this sends many potential Model 2000 buyers to their IBM dealer.

MS-DOS

MS-DOS is the disk operating system that runs the Model 2000. It is fast becoming the standard 16-bit single-user operating system and the majority of today's most innovative software packages are made available first for MS-DOS. The IBM PC uses a slightly different implementation of MS-DOS called PC-DOS which accounts for the compatibility between these two machines. Outstanding among MS-DOS's special features is the ability to create multiple directories of fields which in turn may contain other directories and so on. Mainly designed for hard disk use, this feature allows you to have a number of files only limited by the amount of storage you have available on the disk. With so many files, it is convenient, and in some cases necessary, to organize the disk into multiple directories of related files. The many features of MS-DOS are too numerous and complex to try to describe in one article. Perhaps we'll look further into MS-DOS in a future article.

How Does The 2000 Compare To Big Blue?

The TRS-80 Model 2000 is in many ways superior in features to its obvious competitor, the IBM Personal Compu-

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ter. It is almost as if Tandy took the IBM PC concept and made it better. You don't think that Tandy pays attention to IBM, do you? Sure they do! And they have managed to overcome most of the shortcomings of the IBM PC while adding a few nice touches here and there.

The most common complaint from PC users is the seemingly thoughtless placement of some of the keys on the keyboard. The left shift key, for example, is moved one space to the left and has a backslash key in its place. The numeric keypad doubles as the arrow cursor control keys making it necessary to toggle the Num Lock key to use both arrows and the numbers on the keypad. This is very frustrating. Another gripe is the lack of indicators on the Caps Lock and Num Lock keys. The Model 2000 addresses all these problems while throwing in an additional two function keys, a Hold key, and an ENTER key on the numeric keypad.

The 2000's keyboard is not perfect. It has a very weird placement of the Alt key which is used like the Shift key to alter the meaning of the other keyboard keys. I personally like the positive firm "click" of the IBM's keyboard, but some people prefer the softer touch of the Model 2000's. Another small gripe is that Tandy put the darn keyboard connector where no human hand can reach without tilting the computer. You can't please everyone!

The Model 2000 brightly outshines the IBM in the graphics department. The IBM's highest resolution graphics mode gives you 640 x 200 with two colors (one foreground, one background). The color mode on the IBM offers four colors with 320 x 200 screen points. The Model 2000, in its highest resolution, gives you 640 x 400 with a selection of eight out of the 16 available colors. This is twice the resolution of the IBM with four times the number of colors! The IBM monochrome monitor is not capable of displaying graphics while Tandy's monochrome monitor can (without color, of course).

A nifty feature of the Tandy 2000 screen is the ability to do "smooth scrolling." This means that the screen does not scroll up a single line at a time, but by a single screen scan line. This gives the effect of a smooth scrolling just as if you were slowly pulling a scroll behind the glass on the tube! This feature may be turned on and off and it does not seem to work in BASIC. I use it only to show it off and I doubt that many Model 2000 owners will ever use it because it slows the scrolling to the point of annoyance.

Perhaps the most important improvement over the IBM is the increased speed of the Model 2000. This is a result of the advanced 16-bit processor hidden within. The IBM uses the Intel 8088 microprocessor as its brain while the 2000 uses the new Intel 80186 which is a newer generation of the 8086 (the bigger brother of IBM's 8088). The overall performance of the machine is up to three times faster than the IBM, partly because of the processor and partly the result of faster disk input/ouput with the high density Model 2000 drives.

IBM offers either single- or double-sided track disk drives with 180K or 360K each when using PC-DOS 2.0 or 2.1. The Tandy 2000 uses faster double-sided 80-track thin-line drives that boost the storage to 720K. This alone is good

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reason to choose the 2000 over the PC.

I have experienced intermittent problems with the Tandy drives, however, especially when reading IBM format disks. This problem is not just on my own 2000, but on just about any Model 2000 I've used. It is not a major problem, just a minor nuisance since I can always recover from these errors. I am sure Tandy is aware of this problem and that it is working on a solution.

One area in which the Model 2000 lacks in comparison with the IBM is the availability of third-party hardware expansion options. You can put boards in an IBM PC to do anything from letting you run Apple II software to computer networking. There are no such expansion products available for the 2000 yet from third parties. This situation is sure to change soon.

How Does This Affect Other Tandy Computers?

Radio Shack seems inconclusive on where the Model 2000 fits in its current computer line. It costs about the same as a Model 12, yet it can do much more. It is aimed at the same personal/business market as the Model 4/4P. The truth is that it fits somewhere between the Model 12 and the Model 16.

The Tandy 2000 offers many more features than the Model 12 for about the same price. It's going to be hard to sell the "old technology" Model 12 when there's a flashy new Model 2000 across the showroom. The Model 12 still technically has more software available through Radio Shack, but this is changing quickly. And there is always the fact that you can upgrade the Model 12 to the multi-user Model 16B, although it is not unthinkable that this could become an option for the 2000 at some date. It doesn't look as if the Model 12 will be able to compete with its younger brother for long.

The Model 4/4P may be looking over its shoulders, too. If many people who are considering the 4/4P spend a little more and move over to the Model 2000 camp, we may be saying goodbye to it. The III/4/4P format seems to be very popular, so I don't see this happening soon.

Implications For Tandy

The two best-selling computers today are the Apple IIe and the IBM Personal Computer. Tandy really didn't have anything that directly addressed the features of these two computers until the Model 2000. Now it has a product that is in many ways superior to both. Let's hope they made their move in time.

It is interesting that you will not find "Radio Shack" printed anywhere on this computer. The computer is named the Tandy TRS-80 Model 2000. It has long been said that many people associate Radio Shack with consumer electronics and gadgetry rather than business machines. Tandy hopes that by using the Tandy name on the Model 2000 and future computers, it will set apart the computer products as serious business tools. It is interesting to note, though, that Radio Shack's line of handheld computer games and their video games also bear the Tandy label. So much for serious business machines.

Conclusions

If you're looking at a personal computer that, through expansion, can offer just about anything you want on a single-user computer, you owe it to yourself to take a look at the TRS-80 Model 2000. If you plan to use IBM PC software, check it on a Model 2000 before you buy.

The Model 2000 is an exciting computer that can only be appreciated by getting to know it personally. It is destined to become Tandy's best selling computer and a strong competitor for the IBM Personal Computer and Apple IIe. You can count on the Model 2000's being around for a long time. Unlike many other companies making similar machines, Tandy has the sales network to make theirs an instant success. This means a bright future for Tandy and for people who are wise enough to own the TRS-80 Model 2000.

SOFTWARE

Enhanced *WRITE+* From Portable Computer Support Group

There's now an updated version of the print-formatting software from the Portable Computer Support Group in Dallas. The original version that came out shortly after the Model 100's introduction drew rave reviews from all quarters. *WRITE+* was the first to make the 100 a complete word processor instead of just a text preparation device, but after several months out in the field it became apparent to the PCSG folks that a few modifications were needed. Thus we now have "*WRITE+* Version 2.0," which comes bundled with five other programs (expense spreadsheet, graphs, Telex, facilitator, and two database programs) in a sharp-looking spiral notebook package called Businesspak+ selling for $89.95. Using the M100 for writing, I became one of their first customers — so it was with great anticipation that I unpacked the second-generation version to give it a workout.

First, a description of the overall program. Three separate files need to be loaded from the *WRITE+* cassette — the main program itself (*WRITE+.BA* taking up 3237 bytes), a machine-language command file (*CORTNS.CO* that uses just 196 bytes of RAM), and a user-modified specifications file (*W+SPEC.DO* using 637 bytes). Actually running the program is simplicity itself: it prints the names of all the files on the screen and asks you for the file to be printed, then waits for another carriage return before beginning so you can double check your printer. The first difference between the original and the enhanced version became apparent when I went back to the main menu — that small machine language program, *CORTNS.CO*, no longer appears on the menu in order to reduce clutter. It's not user accessible anyway and since it occupies less than 200 bytes, PCSG recommends just leaving it in place. The second difference I noticed was when I looked over the special text file that stores default values for various standard printing options. Instead of 19 variables, there are now 22. They are: lines per page, line length, top-bottom-left-right margins, printing lines per page, header text, footer text, two other "switches" to turn header and footer on or off, format, line spacing, extra line on paragraph, start printing @ page #__, last page to print, number of beginning page, number of copies, pause between pages switch, feed page at end switch, and output routing. This gives you a highly flexible word processor, and the additions help to fix both things that bothered me about the original *WRITE+*. When the original had printed up the number of copies desired, it would then line feed for another entire page — a waste of paper on my machine. Now,

"feed page at end" is user-selectable. More annoying with the original version was the fact that the software didn't recognize a tab to indent paragraphs. This has been corrected in Version 2.0 and additionally, a switch has been added to let you control the software's formerly fixed command to place an extra blank line between paragraphs. Some other nice additions: multi-line footers or headers and the ability to suppress printing of so-called "orphan lines" — like when the introduction line to your next thought appears at the bottom of the page.

The documentation is also more thorough this time, if not still a little verbose. The most welcome additions: a table of contents at the beginning *and* index at the end. Previously, you had to wade through the entire six pages devoted to *WRITE+* in order to find what you were looking for. Another problem common with all word processors is supporting the wide array of printers people own. Both the original and current manuals describe just two printers' special features: Radio Shack's DMP-100 and Smith-Corona's TP-1. However, I've found my DMP-120 performs exacty the same. Also, another addition was made to the specifications list: "Setup String." This is intended to allow owners of other printers to put in special embedded commands without having to do so in each text file. While the documentation doesn't provide many specifics on using this feature, I can assure you that based on personal experience, PCSG leans over backwards to help if you call them up.

(As we went to press, by the way, Radio Shack's Bill Walters was able to confirm a major marketing agreement with Portable Computer Support Group. By the time you read this, Radio Shack will be selling a PCSG text formatter using a familiar sounding name: *Scripsit 100*. But Walters told me the similarities to the *Scripsit* programs for their other TRS-80 lines stops at the name. It's similar to *WRITE+* in that it uses three files for machine language, BASIC program and specifications document. Radio Shack did order up some enhancements, but Walters said I'd have to wait and see what they are. The folks at Portable Computer Support Group couldn't be happier, because now they have a multi-billion dollar company selling their wares.)

The bottom line for *WRITE+* is the fact that you might expect to spend 90 bucks just for the word processor, but you're getting five other business-related programs as well. To say that this is a bargain in the software world is an understatement. We'll wait and see what the price is on *Scripsit 100*, and how it compares. For now, the *WRITE+* contained within Businesspak+ is the best text formatter there is for the Model 100 . . . five stars all the way.

(Portable Computer Support Group, 11035 Harry Hines Blvd., #207, Dallas, TX 75229, $59.95 on cassette)

— Jim Hawk

HARDWARE

Memory Expansion For The Model 100

If you have recently purchased various software packages that are available for the Model 100 you probably noticed that they came in a 24K or 32K version. You have probably wished you had a machine with 24 or 32K just to feel safe in not running out of memory. If you have added the disk-monitor peripheral then you realize that 32K is almost a necessity. Purple Computing now has an inexpensive solution to your memory problems.

In case you're not too sure about opening up your computer to add memory, the instructions will easily show you how to put your fears aside. The detailed instructions cover in a step-by-step manner how to prepare the work area, including getting rid of any static. First, you should save any important programs, as the first step is to turn off all power — including the memory power.

The only tool that's required is a Phillips screwdriver and it's used to open the computer case. There are four screws which are loosened and the computer turned over to drop them out. With the keyboard facing you, you can grasp the left edges and pop them apart. I found that using the small cassette opening as a starting point worked well. You definitely don't want to use any tools as this could damage some of the components if you slipped.

After the case is opened and laid out, everything is bared before you. The area to really look at is the bottom left corner of the bottom case. There you will find either one (if you have 24K) or three (if you have 8K) spaces open. The memory modules are added from right to left. If you have an 8K machine and only doing an 8K upgrade, then the module goes in location M8. If you have a 24K model then the module goes in M6.

Before you take the module out of its protected case, be sure you are not carrying static electricity. After removing the antistatic foam on the pins of the memory module, set the module into the proper socket. Don't push yet. Carefully check to see that all the pins are properly aligned with the sockets. The small indentation in the module should be facing down or toward you. Push the module into place. At first, I pushed too lightly, being scared I'd break something; but soon I learned that these modules are meant to be almost "snapped" into their sockets.

After reassembling your computer, a cold start must be performed. Turn on the memory power, then the computer, and hold down the PAUSE and CTRL keys simultaneously. Depending upon how many memory modules you added, the memory size shown at the bottom right of the MENU screen should show an increase.

I found this memory upgrade very easy, primarily because of the excellent instructions with illustrations. If you want to save some money on your upgrades and wish to do it yourself, then the memory modules supplied by Purple Computing are the answer.

(Purple Computing, 4807 Calle Alto, Camarillo, CA 93010, $59.95 ppd)

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KANSAS	
Wichita	Amateur Radio Equipment Co.
	Lloyd's Radio
KENTUCKY	
Benton	Anderson Electronics
LOUISIANA	
Slidell	Radio Shack
MAINE	
South Portland	Portland News Co.
MASSACHUSETTS	
Littleton	Computer Plus
Marlboro	Radio Shack
MICHIGAN	
Novi	MI Software Dist., Inc.
Rochester	Rochester Book Center
Sterling Heights	Software City Programs, Inc.
NEBRASKA	
Lincoln	Hobby Town
NEVADA	
Las Vegas	Hurley Electronics
NEW HAMPSHIRE	
Manchester	Brookwrights
Petersborough	Radio Shack
West Lebanon	Verham News Corp.
NEW JERSEY	
Hackensack	Total Circulation Service
Marmora	Outpost Radio Shack
Pennsville	Dave's Electronic Radio Shack
NEW MEXICO	
Albuquerque	News and Bookstore
Albuquerque	Page One Newsstand
NEW YORK	
Brooklyn	Cromland, Inc.
NORTH CAROLINA	
Cary	It's Just For You, Inc.
NORTH DAKOTA	
Fargo	Computer Associates
OHIO	
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	Reitz Electronics, Inc.
OREGON	
Eugene	Libra Books, Inc.
Medford	John's News Stand
Portland	80-Plus
PENNSYLVANIA	
Pleasant Hills	Pittsburgh Computer Store
SOUTH CAROLINA	
Greenville	Palmetto News Co.
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TENNESSEE	
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CORRECTION:

The review of the Disk/Video Interface in the March issue indicated that it would use Radio Shack's VM-1 Monochrome Display. This display is designed for the Model 2000, which has a special connector for the various outputs required by the VM-1; the Disk/Video Interface has only a composite video output and can't drive the VM-1 properly. We regret the error.

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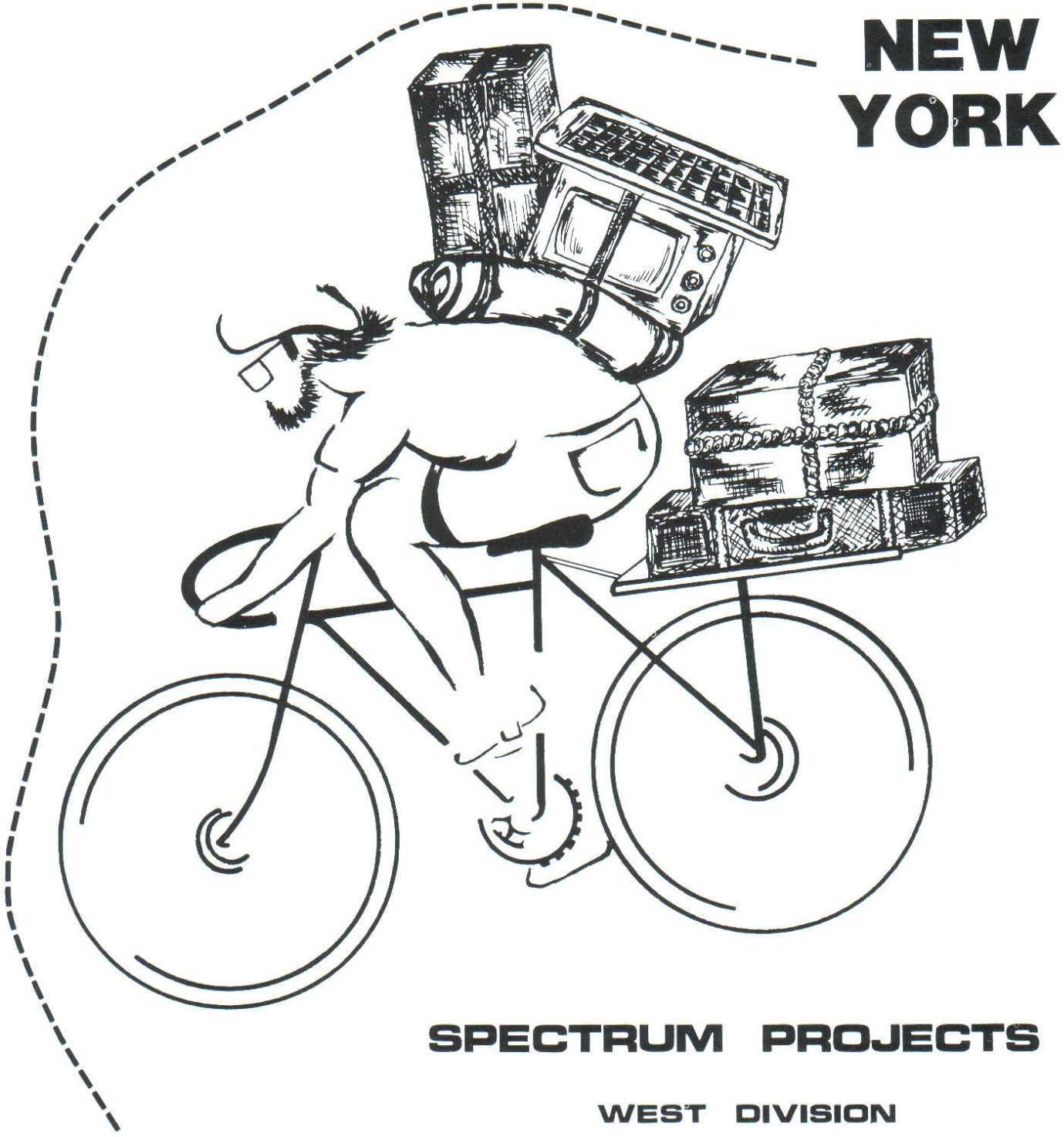

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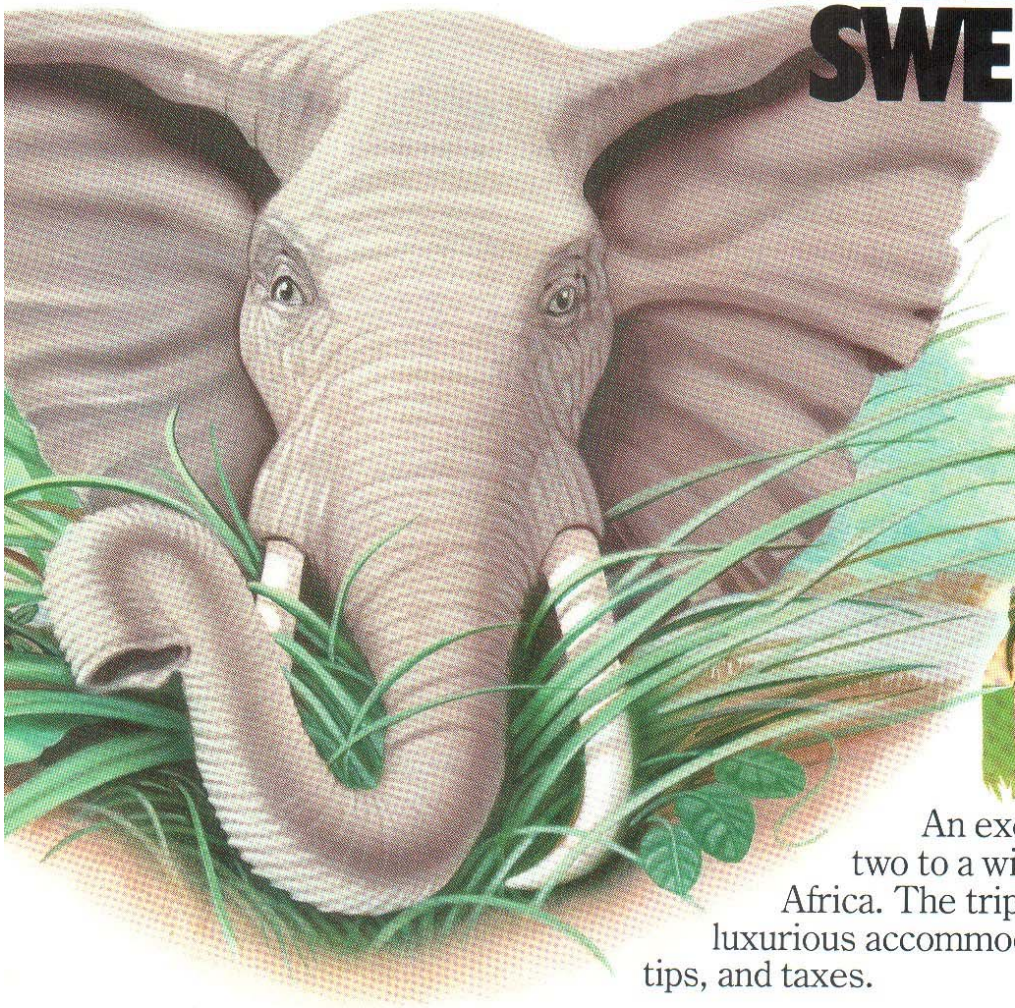

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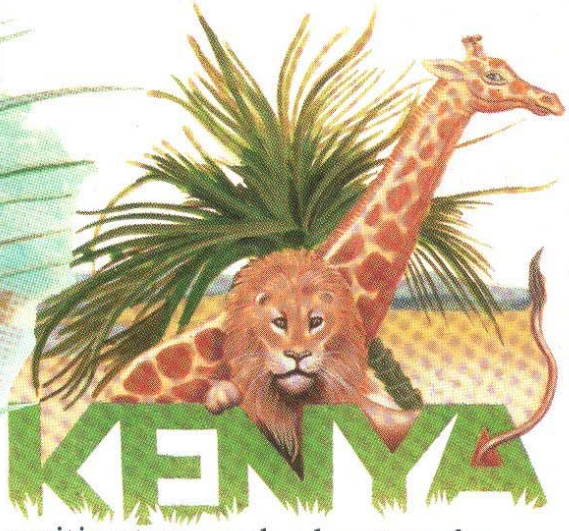

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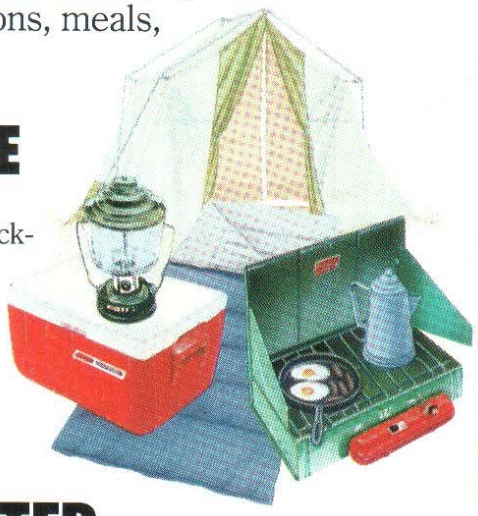

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